Agriculture Handbook No. 202

ACTIVITIES HANDBOOK

Animal Disease Eradication Division

Agricultural Research Service
U.S. DEPARTMENT OF AGRICULTURE

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Washington, D.C. Issued 1961

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"We may thoughtlessly reckon our animal tragedies, the visitations of terrifying, wealth-sapping diseases, in terms of fiscal economy only; but in the annals of history, animal diseases influence the destiny of Nations. They are at the roots of famines, plagues, wars, overturned governments and the lapse of civilizations."

Merillat and Campbell

Foreword

The continued high level of the United States economy is due in part to the large number of livestock in the Nation, and their relatively healthy condition. Although losses to the livestock industry in the United States due to animal diseases and parasites have been estimated to be more than $2 billion each year, our Nation is relatively better off than are most other countries of the world in the prevalence of animal diseases. Many livestock plagues of other lands do not exist here. Conversely, some nations have successfully eradicated diseases that are widespread in this country and for which no eradication programs have been authorized or undertaken.

The Animal Disease Eradication Division of the Agricultural Research Service is responsible to the people of the United States and to the livestock industry for the control and eradication of diseases in livestock and poultry. Progress has been gratifying.

A milestone in State-Federal cooperative efforts was passed with announcement on October 22, 1959, of the eradication of vesicular exanthema.

Before the 7-year campaign ended, the disease had spread into 43 States. Ten countries had placed embargoes on our pork products. Losses ran into millions of dollars.

Incident to the VE campaign, with raw garbage incriminated as the source of many disease organisms, each of the 50 States enacted a mandatory garbage-cooking law. Enforcement of these laws will assist in preventing the introduction and spread of livestock and poultry diseases in the United States.

Screwworms, it is encouraging to report, were not found during the entire year in the Southeastern sterile fly release area. On November 14, 1959, less than 2 years after the start of the campaign, cooperating authorities and scientists ceased the rearing and release of sterile screwworm flies in the Southeast.

This insect pest annually had robbed livestock growers of $20 million. The cost of combat has been less than the livestock losses for a single year. A victory has been won—but the battle against reinfestation continues.

In the brucellosis program a new landmark was reached when on April 25, 1960, New Hampshire became the first brucellosis-free State. In addition to New Hampshire, 12 counties in 4 States were brucellosis-free. At year's end, 23 States and 63 percent of the counties in the Nation, Puerto Rico, and the Virgin Islands were modified-certified brucellosis areas.

Renewed interest in bovine tuberculosis eradication has sparked additional research and was responsible for many meetings in different States throughout the Nation. Forces are being consolidated and a concerted effort is being made toward finding methods to rid the country of this disease.

The State-Federal program for the eradication of scrapie has prevented this disease from becoming established in the sheep of the Nation.

Sheep scabies is once again the subject of considerable attention, and programs are being activated to reduce losses from this disease.

Man has catapulted into a jet age. But disease germs have zoomed along with him. The Division stays alert to the shifting pattern of animal diseases. Liaison with scientists throughout the world has been maintained for the development of plans to cope with emergency situations should exotic diseases find their way into the Nation's livestock.

It cannot be overemphasized, nor too often reiterated, that success in the protection of the country's livestock depends on constant vigilance. To this end we have sought to strengthen the regulations governing the interstate movement of livestock and poultry.

Division veterinarians must be proficient in the basic knowledge of their profession. They

Foreword — (Continued)

must also have stimulus for growth. And in society's increasing complexity they must be given the means to cope with the mounting demands for specific skills and specialized information. We recognize these needs. Our varied training programs are designed to meet the challenge.

Periodically, in order to perform effectively in the present, as well as to plan for the future, it becomes necessary to pause for an examination of the past. This handbook, intended for the use of those intimately concerned with the health of the livestock of the Nation, is dedicated to that purpose.

R. J. Anderson, Director
Animal Disease Eradication
Division

Contents

ACTIVITIES HANDBOOK

Animal Disease Eradication Division

Cooperative Disease Eradication Programs

BRUCELLOSIS

Early efforts

Brucellosis of livestock in the United States has been a serious problem for half a century. Losses have exceeded hundreds of millions of dollars.

The first real efforts to control brucellosis under independent State programs were undertaken in 1922, but little progress was made until 1934 when the problem was attacked on a national scale. In that year the cooperative State-Federal bovine brucellosis eradication program was launched as part of an emergency cattle-reduction project because of drought in many sections. All States cooperated in the plan, and initial testing indicated that approximately 10 percent of the adult cattle in the United States were infected.

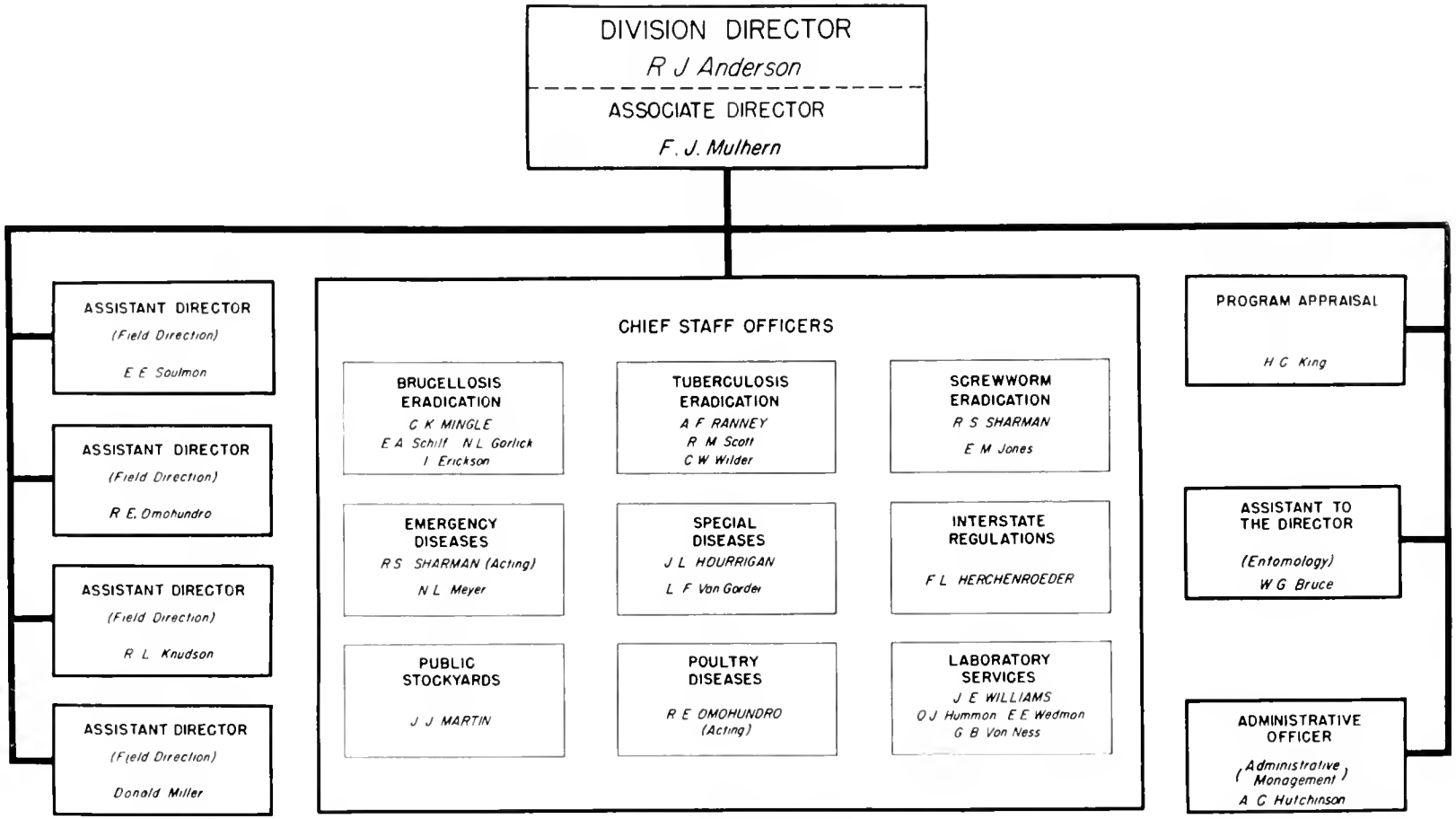
As the drought emergency subsided, the project was continued on a limited scale as a desirable disease-eradication program. It was found to be more economical to eradicate brucellosis than to live with it; and in 1954, funds were made available by the Congress and the various States for an adequate program. Many States were quick to take advantage of the opportunity to participate in a cooperative eradication program, while others lagged and still others have only recently inaugurated complete area eradication efforts. All 50 States now have cooperative eradication programs on an area basis.

Innovations through the years

Considerable progress in eradication was made prior to World War II, but the program was hampered by lack of uniformity in procedures and the fact that a suitable vaccine had not yet been developed. During the war years, the program suffered from lack of personnel. On the brighter side was the introduction in 1941 of strain 19 *Brucella* vaccine. In the ensuing years it has proved dependable and stable, conferring a serviceable, if not absolute, immunity.

In 1947, the United States Livestock Sanitary Association adopted Uniform Methods and Rules for the eradication of brucellosis, which were then approved by the Division. Additions and improvements in the Uniform Methods and Rules have been made from time to time until today the program is similar in all States.

One of the most important developments in brucellosis eradication was the introduction in 1952 of the milk-ring test, which has made pos-



STAFF FUNCTIONS

BRUCELLOSIS: Brucellosis, Leptospirosis, Mastitis
EMERGENCY DISEASES: Foot and Mouth Disease, Vesicular Exanthema, Vesicular Stomatitis, Training
SCREWWORMS: Anaplasmosis, Cattle Grubs, Hag Cholera, Screwworms, Viral Encepholitis
SPECIAL DISEASES: Blue Tongue, Contagious Ecthyma, Dourine, Glanders, Scabies, Scrapie, Tick Fever, Disease Reporting

The information on this chart is based on the functional chart in Administrative Memorandum 102 5 dated September 10, 1959

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NEG 60 (8) 5120

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NEG 60 (10)-5127

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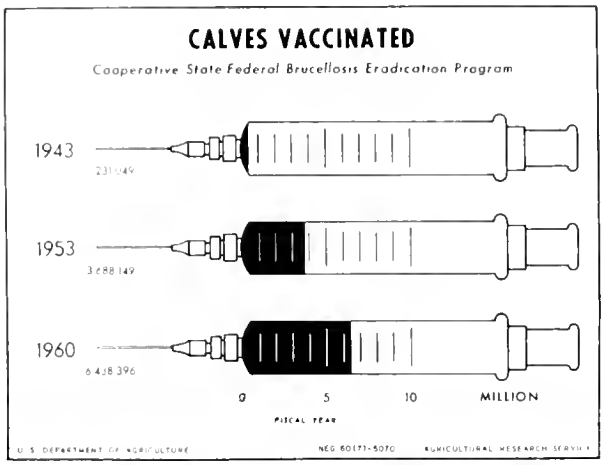
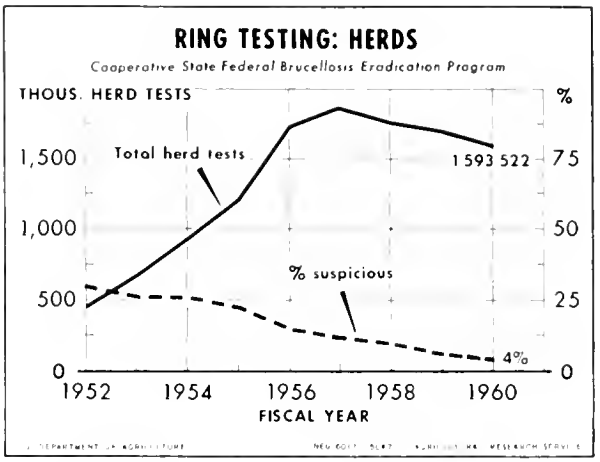
sible the frequent, comparatively low-cost screening of commercial dairy herds. Milk samples from dairy herds are obtained at the milk-processing plants and tested in central laboratories. Suspicious reactions are related to the herds from which the samples were





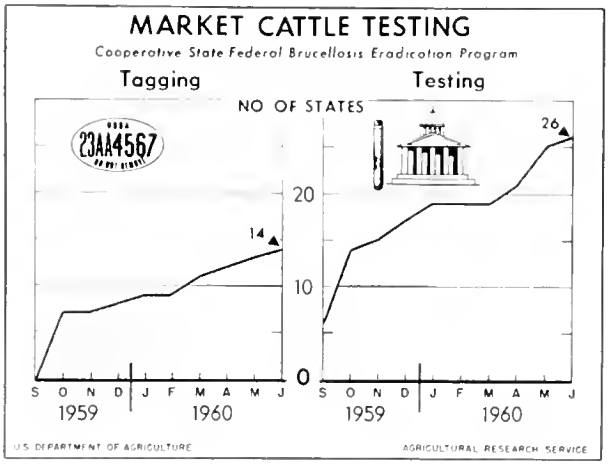
taken, and the cattle in those herds are then blood tested to identify the infected animals. Less than 4 percent of the milk samples proved suspicious during 1960. This compares with 26 percent in 1954. Dairy cattle blood-testing activities during 1960 were concentrated in the

BN-39275

Back tag being applied to cow in market cattle testing program. Cattle bearing these identification tags are blood tested for brucellosis at concentration points and abattoirs.

4 percent of the dairy herds suspicious to the milk-ring test, and almost all testing of negative dairy herds was thereby eliminated.

A very significant part of the brucellosis eradication program is the testing of market cattle at concentration points and abattoirs. This procedure, adopted widely during 1960, is proving particularly effective in screening beef herds, and for evaluating range and semirange areas for recertification. It is now being used extensively in a number of Western States, and has been adopted in some of the Eastern States as well. Under the market cattle testing program, animals are identified by a uniform back tag applied at ranches, farms, or markets. Blood samples are taken from these animals at time of slaughter or sale and forwarded to central laboratories along with the animal identification numbers. The results of negative tests are credited back to the areas from which the cattle originated, and herds from which infected animals came are blood tested.



Evolution of the program

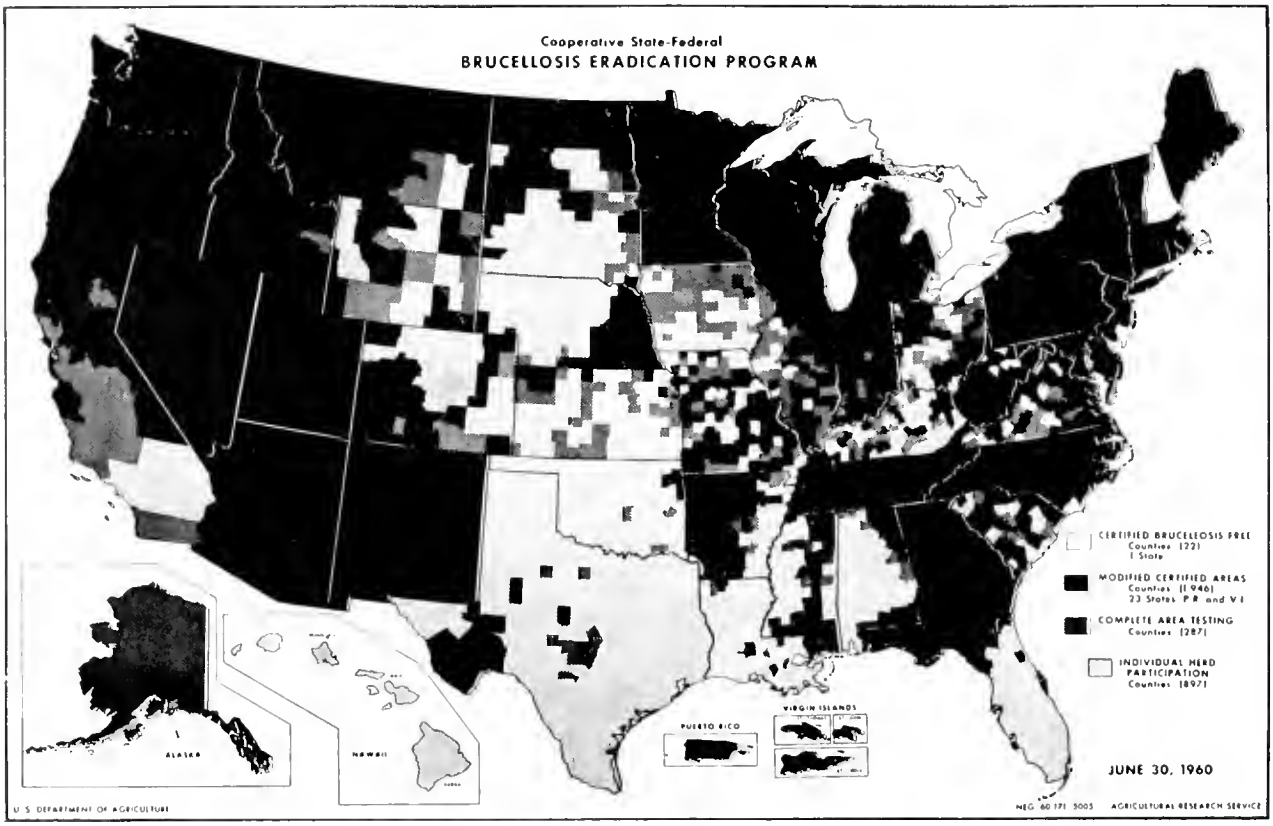
Participation through the years has gradually changed from individual-herd plans designed to meet varying conditions, to compulsory area programs, usually on a countywide basis, for complete elimination of the disease. When, as a result of a test of all herds, the incidence of brucellosis is reduced to not more than 1 percent of the cattle in not more than 5 percent of the herds, the area is designated a modified-certified brucellosis area. By June 30, 1960, 24 States plus Puerto Rico and the Virgin Islands had been so designated. In addition, there were more than 800 modified-certified brucellosis area counties in 24 of the remaining 26 States. With almost 300 counties working toward initial certification, approximately 72 percent of the Nation is participating on an area basis.

Current accomplishments

The first county to be recertified by market cattle testing was Benton County, Wash., in March 1960. The market cattle testing program eliminated 92 percent of the testing necessary at the ranch under alternate recertification procedures. When market cattle testing is universally adopted, the savings to livestock owners will be significant. The much broader, more effective screening coverage also will help assure eradication.

Federal funds available for brucellosis eradication during 1960 were reduced substantially. As a result, a period of readjustment was necessary, during which the number of new areas being added to the program was decreased by more than 40 percent as compared with 1959. The number of new county certifications dropped approximately 28 percent. Further, the number of new county certifications possible during 1962 will be even less, for it generally takes more than a year for a county to qualify for certification. Available funds for 1960 were channeled into areas that had accomplished the most work in preceding years, and those that were close to certification. High priority was given to areas that were already modified certified so that the gains already made would not be lost and progress toward eradication could continue. Services previously offered in some areas (such as vaccination, and tests of infected herds in areas not yet embarked on a complete program) were curtailed. Some States requested that the payment of Federal indemnities be discontinued so that the funds could be utilized for testing and vaccinating.

Although limited progress was made in all areas, the program was not operating as an optimal eradication program during 1960. The goal of complete eradication, formerly in sight, seemed more remote. However, with the in-



creased funds available for 1961, eradication activities can be accelerated and by the end of the year should be back to an adequate level. In combating brucellosis as in any other disease, the sooner all areas are brought into the program the lower will be the ultimate cost of eradication.

Epidemiologists specially qualified in brucellosis eradication activities are being assigned to the various States as the need arises. They are carrying out detailed programs designed to eliminate the disease from all remaining infected herds. Backed by competent laboratory services, these veterinarians are utilizing all known procedures for detecting and eliminating brucellosis. Their progress during the past year in cleaning up formerly infected herds has been gratifying.

New Hampshire brucellosis free

The most significant event in the brucellosis eradication program in 1960 was the attainment by New Hampshire of brucellosis-free status. To achieve this status all herds in an area must be tested within a period of 18 months. Any herds that were formerly infected must be negative when retested, thus leaving no known foci of infection. In addition, when brucellosis is found or suspected in other species of domestic animals, they must be retested and the disease eliminated.

New Hampshire has had an active brucellosis eradication program for many years. This State was the second to achieve modified-certified brucellosis area status; it reached that goal in 1949. At the beginning of the program, in 1934, 49 percent of all herds and more than 10 percent of all cattle tested in the State were infected. During subsequent years the total number of infected animals identified and removed approximately equaled the cow population of the State.. When compared with early losses, New Hampshire has consistently made a 100-percent profit on the State-Federal investment in brucellosis eradication, for the annual cost of the program has been only one-half of what former losses had been.

A look into the future

New Hampshire will be an example to other States that brucellosis eradication is both desirable and attainable with the methods and tools now available. Many counties in other States are now qualifying as brucellosis-free. Those States that have not yet attained modified-certified status are intensifying their efforts in order that they will not be too far behind in the final eradication effort.

SCABIES

At the turn of the century, scabies was a major problem confronting the livestock industry. Today, after half a century of concentrated effort to eradicate the disease, it is still a problem.

The recent past

Following a costly 40-year campaign that began in the early 1900's, it was believed that cattle scabies had been eradicated from the western range States. For 2 successive years, 1948 and 1949, no infected herds were reported. But, as a degree of complacency developed, reports of infected herds increased. Annual figures reported were: 28 in 1954, 30 in 1955, 7 in 1956, 25 in 1957, 4 in 1958, 27 in 1959, and 4 in 1960.

In January and February 1959, psoroptic scabies was found in Kansas in Chase, Clark, Ford, Gove, Kearny, Lane, Meade, and Wichita Counties. On February 6, Clark, Gove, and Meade Counties were placed under Federal quarantine. State quarantine had been imposed on these counties on January 31. All infected and exposed herds were treated, and the remaining herds were inspected before warm weather arrived. No additional infection was disclosed. On May 28, Federal quarantines on Clark and Meade Counties were lifted. An additional inspection of all cattle in Gove County was completed after the beginning of cold weather in the fall, and all herds were found free of scabies before the quarantine was lifted on February 29, 1960.

During 1959, psoroptic cattle scabies was also found in Illinois (De Kalb, Du Page, Knox, and Ogle Counties); in Iowa (Clay, Emmett, and Pottawattamie Counties); in Nebraska (Dawson, Otoe, and Sarpy Counties); and in Texas (Ochiltree and Hemphill Counties).

Sheep scab on the increase

The incidence of scabies in sheep has increased in recent years. With this increase there has been a resultant rise in the number of infected animals found at public stockyards. Cases found at these yards are a reliable barometer of infection reservoirs in the States of origin.

In Louisiana and Mississippi, however, Federal quarantines that had been in effect more than 30 years were lifted July 8, 1957. The Louisiana parishes affected were Allen, Beauregard, Calcasieu, and Vernon; and the Mississippi counties were Forrest, George, Greene, Hancock, Harrison, Jackson, Jones, Lamar, Pearl River, Perry, Stone, Wayne, and Marion County east of Pearl River.

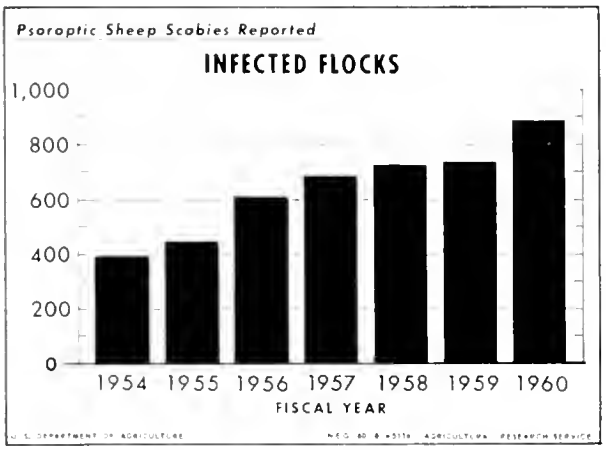
In 1957 and 1958 following the introduction of sheep from out of State, Wyoming reported outbreaks of sheep scabies. In November 1959, psoroptic sheep scabies was diagnosed in seven ewes imported from Pennsylvania into Boulder County, Colo. The sheep entered Colorado contrary to State requirements. The small flock, which consisted of the seven infected animals and eight other exposed sheep, was placed under State quarantine and customary dipping procedures were carried out. No other sheep were involved and there had been no movements from the infected flock.

New Mexico reported sheep scabies in Lea County in 1959, and at a packing plant in Bernalillo County in 1960. All sheep at the packing plant where the disease was found were quarantined, and infected and exposed sheep slaughtered. Sheep purchased during the preceding 12 months were traced to locate the source of the outbreak. Inspections failed to reveal further evidence of scabies or the source of infection. Prior to these outbreaks, scabies was last reported in New Mexico in 1953.

Training

Training is an important aspect of scabies eradication and has received increasing empha-

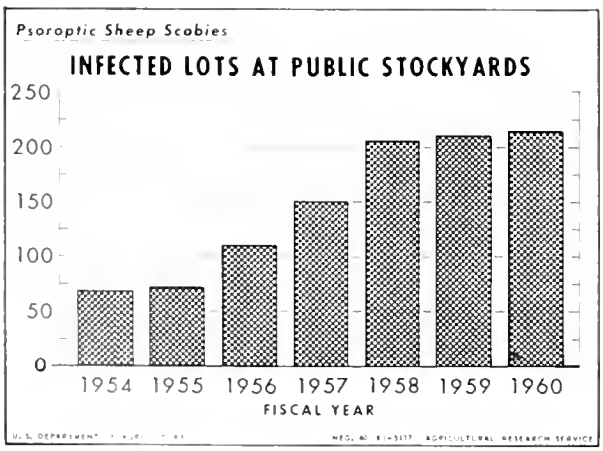
sis in recent years. From 1953 to 1960, 97 State and Federal employees attended 3-day scabies training sessions. The courses were designed to give practical instruction in diagnosis and in the principles of eradication.



Sheep scab regulations

In March 1960, psoroptic sheep scab was again reported in New Mexico. And during the year, 214 scab-infected lots were found at public stockyards.

The movement of scabby sheep from midwest farm States has become an increasing problem. The range States, considered free



of scabies, face the constant threat that the disease will be introduced from Midwestern and Eastern States where scabies has not been attacked so vigorously.

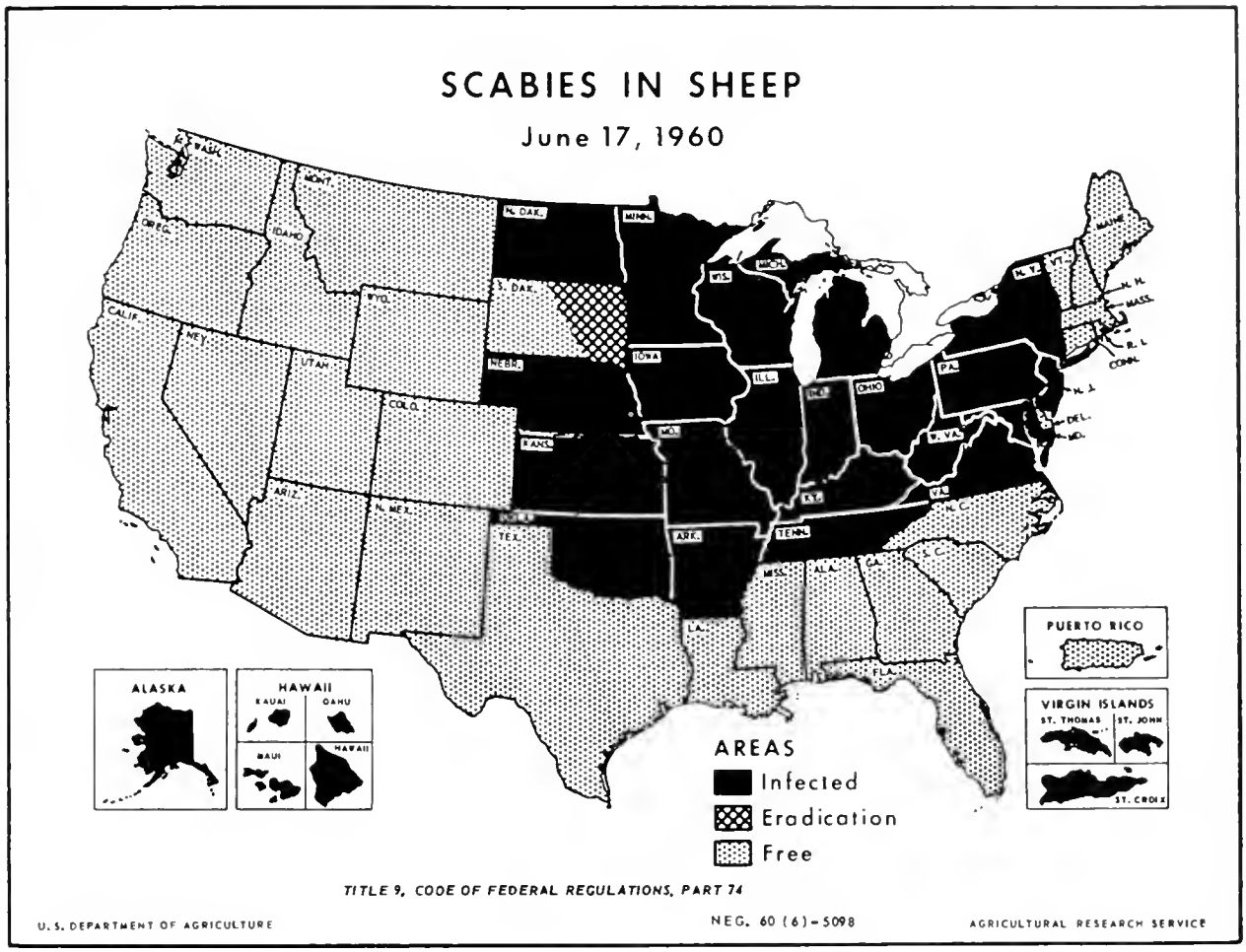
In general, the disease now is confined to an area bounded on the west and south by the States of North Dakota, Eastern South Dakota, Nebraska, Kansas, Oklahoma, Arkansas, Tennessee, and Virginia. In recognition of this situation, and in an attempt to give impetus to scabies eradication, part 74, title 9, Code of Federal Regulations was amended June 17, 1960, to be effective August 1. The amended regulation designates free and infected areas and provides for the designation of eradication areas when State and Federal officials mutually agree to a program. Eastern South Dakota was the first to be so designated.

The regulation provides for the official inspection and dipping of infected and exposed sheep prior to interstate movement. The regulation also requires inspection and dipping of all sheep from an infected area that are moved to free or eradication areas, except those moved to recognized stockyards and slaughtering establishments. Sheep from a free area may be moved without restriction. The movement of clean sheep between States in an infected area is not controlled by the regulations. Thus, the free area is better protected and incentive is provided to States in the infected area to initiate programs that will give them increased protection as eradication areas and eventually all the benefits of scabies-free status.

Mange mistaken for scabies

Cattle mange is frequently diagnosed in the field as psoroptic scabies and similarly, psoroptic scabies is, on occasion, initially reported as mange. Programs in the Western States have effectively attacked chorioptic and sarcoptic mange. The disease is reported when found at stockyards and livestock shows, traced to origin, and energetically combatted.

Chorioptic mange was diagnosed in 60 lots of cattle at the International Livestock Exposition held in Chicago, Ill., in November 1959. They had been shipped to the show from Illinois, Iowa, Michigan, New York, Ohio, Texas, and Wisconsin. At the American Royal Livestock Show held in Kansas City, Mo., in October 1959, chorioptic mange was diagnosed in three lots of cattle that originated in or were shipped to the show from Illinois and Iowa.



During the year, outbreaks of mange—first thought to be psoroptic cattle scabies—were reported from Alabama, Oklahoma, and Wyoming.

Chorioptic mange was also reported from Oregon. The outbreaks occurred in two flocks of sheep in Benton County and in three herds of goats in Clackamas and Lane Counties.

The situation in cattle scabies

Psoroptic cattle scabies was reported in a large feedlot in Weld County, Colo.; a dairy herd in Marshall County, Ind.; a feedlot in Pottawattamie County, Iowa; and a ranch in Baker County, Oreg. Infected and exposed cattle were treated, and an effort was made to locate the source of the outbreaks.

In November 1959, mites were found in a shipment of four bulls and one cow trucked to the Ogden Union Stockyards in Utah from Sublette County, Wyo. Specimens submitted to the Utah State University and to the ADE Diagnostic Laboratory were identified as sarcoptic. Additional infected animals were found in the Sublette County herd and on adjacent ranches. An eradication program was started immediately. The disease may have been present in the area for some time.

The Bureau of Land Management cooperated by refusing entry of undipped cattle from quarantined areas to lands administered under the Taylor Grazing Act. A State quarantine was placed on a large area in Lincoln, Sublette, and Sweetwater Counties. Additional inspectors from Colorado, Nebraska, Texas, and Utah were assigned to assist in the eradication effort.

Inspection of all cattle in the quarantined area—about 145,000—revealed infection in 14 herds. Cattle in all herds in the quarantined

area were considered exposed. About 100,000 cattle were dipped in lindane, including some 5,000 outside the quarantined area dipped at owners' requests. Thirty dipping vats were used, 20 of them newly constructed because of the outbreak. Infected herds were dipped twice—exposed herds once—in temperatures as low as —38 F. Reported losses were one cow and six calves. One calf drowned, and five were sick when dipped. Many of the animals were in very poor physical condition when treated.

Movements from infected herds were traced to destinations in California, Colorado, Idaho, Illinois, Kansas, Nebraska, Utah, and Wyoming. Cattle from infected Wyoming herds had been moved to several premises in Idaho and Nebraska. Inspections revealed one infected herd in Bingham County, Idaho, and one in Keith County, Nebr. Both herds were dipped twice. Inspections did not reveal any evidence of the disease in other Idaho and Nebraska herds involved. The Idaho herds were treated twice, except those in feedlots. They were inspected and held under quarantine until treated or slaughtered. Cattle from infected Wyoming herds received in other States were inspected and no scabies was found.

Mites on elk

During 1960, mites identified as *Psoroptes equi* var. *cervinae* were found on elk in Idaho and in Wyoming. A skin condition was noticed on the elk, which had been shot in Benewah County, and a veterinary practitioner was called. The veterinarian sent specimens to the laboratory, where they were identified as psoroptic. In Wyoming, scabies lesions were observed when members of the Game and Fish Commission were putting elk through chutes for tagging and identification purposes at the Jackson Hole feeding grounds. Laboratory studies confirmed that mites harvested from a dead elk were psoroptic. Psoroptic mites have been found over a period of many years on elk and on bighorn sheep in several Western States.

The presence of scabies in wildlife suggests that they may be a reservoir from which the disease may spread to domestic animals. However, there has been no good evidence, at least during the recent years, that this has occurred. Two requirements are necessary for this to happen: (1) Mites on wildlife must be able to propagate on domestic animals, and (2) they must have the opportunity to spread from wild to domestic animals. In this country, scabies has not been observed to spread to domestic animals from bighorn sheep or elk, and outbreaks during recent years in cattle and sheep are not believed to have been caused in this manner. The problem deserves further study.

Field trials—cold lime-sulfur dips

During recent years, public attention has been drawn to the problem of chemical residues laid down in tissue through treatment of animals. It is also recognized that some acaricides made available for the control of scabies, ticks, or both might not be effective eradication agents.

Following careful study of these related problems, it was decided to conduct field trials in an effort to prove the efficacy of dips as eradication agents and to determine whether a variation of dipping methods or procedures might reduce the tissue-residue hazards to human health. Consequently, in March and April 1960, field trials were conducted in Iowa to determine whether cold liquid lime-sulfur plus a wetting agent could be used effectively in sheep scabies eradication. Eight infected and quarantined flocks totaling 411 sheep were selected in widely scattered communities. Sheep were dipped twice at 10- to 13-day intervals regardless of temperature and weather, or age and physical condition of the animals.

The trials indicated that healthy lambs and adult sheep could be dipped in cold liquid lime-sulfur bath at 29 F., in an atmospheric temperature of 16°, with no deleterious effects. The addition of the wetting agent Triton GR 5 at 13 ounces to 100 gallons of water gave complete dip penetration and kept fleece damp for 4 to 5 days thereafter. Farm waters, regardless of degree of harshness, did not disturb the equilibrium of the lime-sulfur solution. Immersion of adults for 3 minutes and lambs for 1 to 1½ minutes in a bath maintained at not less than 2-percent "sulfide-sulfur" concentration, killed mites within 24 to 48 hours following first dipping. Inspections were made at

BN 11613

Typical scabby sheep.

BN-12702

Scab lesion.

BN-11612

Vat-side test to determine the percentage of "sulfide-sulfur" in dip solution.

BN 11609

Scabby sheep being marked and tagged, to aid in post-dipping inspections.

BN 11610

Sheep being dipped for 3 minutes in cold liquid lime-sulfur.

30-day intervals, and live mites had not been found 90 days later. Inspections at 3-month intervals are to continue for 1 year.

Additional field trials with cold lime-sulfur will be conducted during 1961. Decision concerning the use of cold lime-sulfur in scabies eradication activities will await completion of these trials.

SCRAPIE

Scrapie in history

Scrapie has been known in Great Britain and Western Europe for more than 200 years. There is evidence that Spanish Merino sheep may have carried the disease into Europe. The disease has been reported in Australia, Austria, Canada, England, France, Germany, Hungary, Iceland (where a similar disease is called Rida), New Zealand, Norway, Poland, Scotland, Spain, and Wales.

The first report in the United States was from Michigan in 1947. Scrapie was again reported in October 1952 when, in two related California outbreaks, 21 sheep showed symptoms. The United States Livestock Sanitary Association and segments of the sheep industry urged immediate eradication action. And on October 31, 1952, with an emergency declaration by the Secretary of Agriculture, the cooperative Scrapie eradication program was established.

All sheep in the two California flocks and all exposed sheep moved from them were slaughtered, as were the immediate progeny. The 55 premises involved were cleaned and disinfected. More than 7 years have passed with no extension of infection from these outbreaks. California has since suffered six additional outbreaks that were not associated with those in 1952. The source of the earlier outbreaks is believed to have been a Canadian flock.

BN-7725

Sheep rubbing against fence rail—an early symptom, from which the disease derives its name.

The disease struck next in Ohio where, in 1953, five infected flocks were found. The eradication program in Ohio included slaughter of infected flocks but not exposed sheep moved from them or the immediate progeny of the exposed sheep. Certain of these animals in Ohio and Tennessee were later found to have scrapie. During the same year, scrapie was diagnosed in three Illinois flocks. These flocks and exposed sheep moved from them were slaughtered.

In both Ohio and Illinois it appeared that the disease had been introduced from the Canadian flock involved in the first California outbreaks.

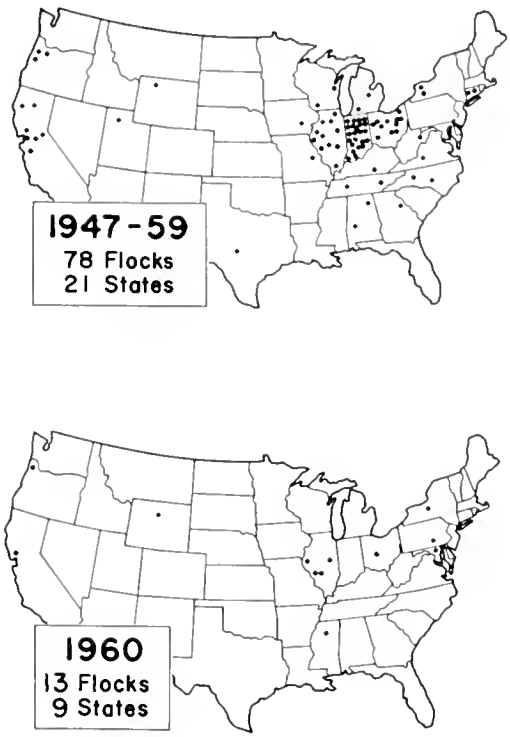
Indiana has had 23 infected flocks—more than any other State. The earliest case was in August 1954, and the most recent in April 1959. Eight of these flocks, as well as two in Alabama, two in North Carolina, and one in Missouri, acquired the disease through movements of exposed sheep from one of the Indiana flocks. These 13 outbreaks in 4 States resulted from the movements of 322 exposed sheep into 85 flocks in 14 States—a classic example of spread. Had the remaining exposed sheep not been slaughtered, additional cases would undoubtedly have developed.

It became obvious that scrapie could not be eradicated unless both source and infected flocks were slaughtered; and that exposed sheep from those flocks and their immediate progeny should be slaughtered also. Source flocks were defined as those determined on ample evidence, and after careful consideration and consultation, to be disseminating scrapie; but in which no animals were found that showed symptoms of the disease.

In the United States, 91 infected flocks have been reported in the following 24 States: Alabama 2, California 8, Connecticut 2, Georgia 1, Illinois 15, Indiana 23, Iowa 1, Kentucky 1, Maryland 2, Michigan 2, Mississippi 1, Missouri 1, New York 3, North Carolina 2, Ohio 12, Oregon 4, Tennessee 2, Texas 1, Utah 1, Virginia 1, West Virginia 1, Wisconsin 2, and Wyoming 2.

There were 10 outbreaks in 1953; 3 in 1954; 11 in 1955; 23 in 1956; 12 in 1957; 7 in 1958; 11 in 1959; and 13 in 1960.

SCRAPIE-Infected Flocks Reported



Cooperative scrapie eradication

The cooperative eradication program is based on procedures long used to eradicate other diseases, with modifications required by the unusual nature of scrapie. Prompt reporting of suspicious cases is stressed.

Tentative clinical diagnosis is confirmed by histopathological studies of brain tissues. Suspect animals are maintained under observation and are slaughtered until symptoms are fully developed.

Scrapie in other countries

In August 1959, the Canadian Scrapie eradication program was broadened so that Canada and the United States, whose regulatory officials had worked closely, now have equivalent programs. Canadian officials have given assurance that sheep which would have been slaughtered under the current program, had it been in effect in April 1957, will not be certified for export to the United States.

Australia and New Zealand—where it is believed scrapie had been newly introduced by imported sheep—also instituted an eradication program. Officials in both countries believe their efforts to eradicate scrapie have been successful. One outbreak among imported sheep in Norway is being similarly handled.

In certain countries where scrapie is endemic, owners attempt to reduce the incidence of the disease and the stigma of having an infected flock by slaughtering selected animals of certain bloodlines. These do not represent organized efforts to eradicate the disease.

Infected flocks and source flocks are quarantined. All sheep and goats in such flocks are slaughtered under supervision at authorized slaughtering plants. Exposed animals moved from these flocks and their immediate progeny are slaughtered. Premises and vehicles are cleaned and disinfected.

Principles of eradication

Research efforts to produce a vaccine to increase resistance have been discouraging. If either breed resistance or individual animal resistance exists, it might be possible to develop strains of scrapie-resistant sheep. Even if possible, this would be a long and laborious undertaking.

Preventing exposure of susceptible sheep is the only method now known of avoiding additional outbreaks. Until research proves conclusively whether scrapie spreads from parent to offspring, or by some form of contact, any effective program must follow appropriately modified conventional methods which embrace both possibilities of spread.

Since the agent is known to exist in visibly affected sheep, it is clear that they must be destroyed. There is no diagnostic test for the disease in an animal not showing symptoms; consequently, there is no way of knowing how many exposed animals may harbor the infectious agent. This factor, linked with the long incubation period, necessitates the slaughter of all exposed animals.

BN 7333

An advanced case of scrapie.

Scrapie studies

Each outbreak is carefully studied to establish the epidemiology of the disease. Particular attention is given to symptoms, laboratory findings, age, sex, breed, history, and pedigree of each infected animal, movements from infected flocks, and the possible source of the outbreak.

During the 7 years the eradication program has been in effect in this country, it has not been possible to identify the source of several outbreaks. The majority, however, fall into a pattern and indicate spread from a limited number of common foci. Such foci—usually identified as source flocks—are now being slaughtered.

Approximately 80 percent of the infected sheep in this country either were imported or were the immediate progeny of sheep of foreign registry. The broadened Canadian program should materially reduce the possibility for further introduction of scrapie through sheep imported from Canada.

Exposed sheep and their immediate progeny from 1,800 flocks have been slaughtered. Presently, some 1,500 flocks are receiving the required 6-months' inspection. In November 1956, more than 2,000 flocks were under inspection. These routine inspections have helped locate infected animals. Almost 50 percent of the 91 outbreaks were found in this manner.

Sheep under 18 months of age seldom show symptoms of natural scrapie. Only one of the 161 infected sheep in this country was 18 months old; the others were older. Three were more than $7\frac{1}{2}$ years old. The great majority were from $2\frac{1}{2}$ to 4 years old with most being about 3 years of age.

Mortality rates are difficult to determine with certainty. When an outbreak occurs, the entire flock is slaughtered before additional cases have time to appear.

Of the 161 confirmed cases in the United States, 151 were Suffolk sheep and 10 were Cheviots. Although the majority of cases have occurred in one breed, it is generally believed that sheep of any breed can develop the disease.

The manner in which scrapie spreads is not well understood. Both experimental and field evidence suggest it can spread from the dam, and perhaps the sire, to the progeny. The evidence, however, does not explain how the disease spreads from one breed to another.

Eradication and research

The 91 outbreaks in the United States illustrate the potential danger of an insidious disease like scrapie in a country where lively trade among growers results in wide distribution of sheep and their diseases.

We look forward to additional research results—particularly those designed to explain natural transmission. Precise information will permit more exact identification of potentially dangerous animals and may require slaughter of fewer sheep.

Experience is convincing that the elimination of infected and exposed animals has effectively controlled the disease, prevented it from becoming widely established in Cheviot and Suffolk sheep, and prevented spread into other breeds.

The chances for ultimate success appear good if sound eradication procedures, supported by ample research, are continued.

SCREWWORMS

The screwworm, *Callitroga hominivorax* (Cqrl.), is an obligatory parasite on warm-blooded animals and causes myiasis. Myiasis is defined as "any disease caused by the presence of the larvae of flies in or on the body of an animal." Since screwworm attack, or

myiasis, is a disease of domestic animals, the Animal Disease Eradication Division was assigned the responsibility of effectuating a program to eradicate this insect pest from the Southeastern United States.

BN-4384

Screwworm flies: *Left*, male; *right*, female.

BN-1416-X

Larvae of screwworm.

Early investigations

Screwworms have been known in Texas since 1842. During the summer months infestations spread to adjoining States but subsequent cold, winter weather usually killed all but those in southern Texas. Screwworms were unknown in the Southeast until the summer of 1933, when the first infestations were reported in the vicinity of Boston, Ga. They spread rapidly and within 2 years were found throughout Florida. Each summer, infestations spread into Georgia, Alabama, and occasionally farther north, but they were subsequently killed by cold, winter weather in all Southeastern areas except peninsular Florida.

Heavy losses sustained by the livestock industry of the Southeast due to screwworm at-

BN-4375

Eggs of screwworm.

BN-4380

Pupae of screwworm.

tack had stimulated 20 years of agitation for an eradication program. However, although good control methods were available, they were not considered sufficiently effective to justify an eradication effort until the development of a revolutionary approach to insect control. This concept envisioned the elimination of an insect pest by overwhelming the native population with sterile male flies. Since female screwworm flies when mated with sterile male flies laid only infertile eggs, race suicide seemed possible.

Research entomologists of the Agricultural Research Service conceived and developed the sterile-fly method of insect control. Basic techniques for the rearing, sterilization, and distribution of screwworm flies were perfected and field trials demonstrated that screwworms could be eliminated from localized areas.

Early in 1957, a team of a veterinarian and an entomologist surveyed the screwworm situation in the Southeast. Their purpose was (1) to determine losses due to screwworms, (2) to evaluate the probability of success of an eradication program using the sterile-fly technique, and (3) to estimate the cost and duration of such a program. The survey revealed an annual loss of approximately $20 million in the Southeast, half of which was in Florida. The surveyors concluded that screwworms probably could be eradicated in 2 years at a cost of about $10 million.

Further investigation revealed that an area of some 50,000 square miles, mostly in peninsular Florida, would require weekly dispersals of sterile male flies averaging 500 per square mile. This called for a building of sufficient size, and with adequate equipment, to produce a minimum of 50 million flies per week. Expansion from an experimental fly-rearing plant, with production of about 2 million flies per week, required the design and construction of new equipment, improvement and mechanization of all operations synchronized to the life cycle of the fly, a method of automatically packaging irradiated pupae, and development of an apparatus for airplane dispersal of packaged flies.

Eradication in operation

Federal-State funds for an eradication program became available during the summer of 1957. Plans were immediately made to convert an airplane hangar at Sebring, Fla., into a huge fly-rearing establishment. Because of the time required to remodel the hangar and to design and build suitable equipment, operation was not expected before July 1, 1958. In the interim, it was decided to use the small, experimental fly-rearing facility near Orlando, Fla., to train personnel, and to test and develop new methods and materials.

The winter of 1957-58 was one of the coldest and wettest in Florida history. Low temperatures in the north and excessive moisture in the south decimated the screwworm population, and restricted the pest to a comparatively small part of southern Florida. In an attempt to halt the northward movement of flies until the new fly-rearing establishment could come into operation, an artificial barrier was established by dropping sterile male flies over the northern part of the State.

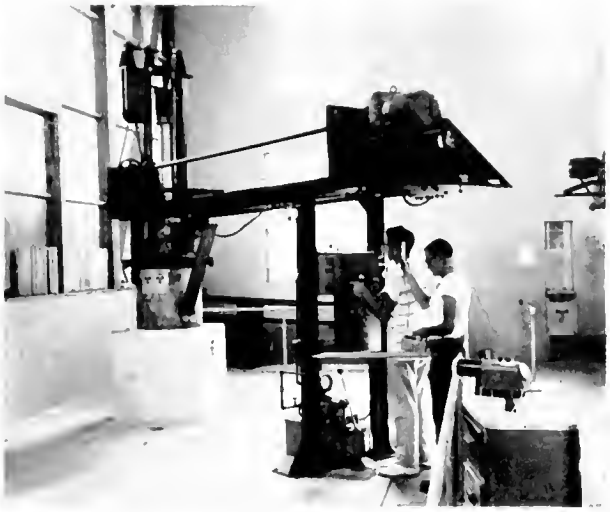
Production at the small plant was soon increased to approximately 10 million flies per week—a sufficient number to maintain an effective barrier and prevent widespread northward migration of native flies. By late spring a State quarantine line had been established across peninsular Florida, extending east and west from Ocala, to prevent the northward movement of infested livestock. Animals in transit from south of the quarantine line were inspected and sprayed before they moved into uninfested northern areas.

N-28623

Mechanized fly-rearing facility converted from airplane hangar, Sebring, Fla.

N 30242

Screwworm larvae growing on meat-blood-water mixture in electrically heated vats.



N 30232

One of six cobalt-60 units for sterilizing pupae of screwworms.

The Sebring fly-rearing facility was completed on July 10, 1958. Within a short time, 50 to 70 million flies per week were being produced and dispersed.

Larvae were reared on a mixture of ground meat, blood, and water in shallow, heated vats maintained at a constant temperature of 98° F.

Approximately 80,000 pounds of meat, 4,500 gallons of blood, and 9,600 gallons of water were needed to rear 50 million larvae. Mature larvae crawled from the vats and dropped into trays of sand where they pupated. Pupae were separated from sand and stored under optimum temperature and humidity conditions. At 5½ days ±6 hours of age, pupae were sterilized by being placed in a cobalt-60 unit where they were irradiated with 8,000 roentgens of gamma rays. After irradiation, pupae were packaged in cardboard cartons. The cartons were first stored for a day or two until the flies emerged and then were transported to dispersal centers and loaded in aircraft, from which they were dropped over the screwworm-infested areas. Twenty airplanes, each equipped with an automatic carton-dispersing apparatus, were used in this operation.

N 30246

Pupae being separated from larvae by sifting.

N–30226

Pupae are automatically measured into cardboard cartons.

N-28349

Airplane releasing carton of sterile flies.

The greatest numbers of sterile flies were dispersed in the most heavily infested areas and lesser numbers in the lightly infested areas. Federal and State livestock inspectors throughout the Southeastern States examined livestock and maintained close cooperation with livestock owners to determine the incidence and relative abundance of screwworms.

The native screwworm population gradually declined, and by the end of 1958 screwworms could be found only in Broward and Dade Counties, Florida, where a localized infestation persisted. This pocket of screwworms was finally eliminated. The last case in the region was found and destroyed February 19, 1959. The only infestation that has been found in Florida since that date was in a dehorning wound, in Highlands County, on June 17, 1959.

Challenge and termination

The apparent absence of screwworms in Florida for several weeks prompted program officials to test the effectiveness of the eradication effort by discontinuing release of sterile flies in a large part of the formerly infested area. Accordingly, in mid-July 1959, release of sterile flies was discontinued in that portion of Florida south of an east-west line through Lake Okeechobee. The number of livestock inspectors in the untreated area was doubled, and livestock owners were urged to make frequent inspections and promptly report any evidence of screwworms. When no infestations were reported in the test area in the ensuing 3 months, rearing and release of sterile flies were progressively diminished in the remainder of the Southeast.

Screwworm fly rearing operations ceased, and the last sterile flies were dispersed on November 14, 1959. The building then was sealed and sprayed with an activated pyrethrin insecticide, and on the following day fumigated with DDVP and TEPP. These precautions were taken to ensure destruction of any fertile screwworm flies that might escape from the heretofor fly-secure building and repopulate the area. The establishment was then placed on a standby basis to remain available for emergency use.

Continuous alert

Continuing systematic animal inspections for evidence of screwworms, and trapping and identification of flies in areas over which sterile flies had been released, ensured rapid detection of wild flies or larvae that might still survive in the eradication area.

An insurance screwworm colony is maintained at a Department laboratory in Texas. Stock from this parent colony could be used in an emergency to combat future localized outbreaks.

During and following eradication efforts in the Southeast, it has been necessary to guard rigidly against reintroduction of screwworms on animals moving interstate from the screwworm-infested Southwest. This protection has come, through Federal regulation, from the establishment of 13 livestock inspection stations along the eastern borders of Arkansas and Louisiana.

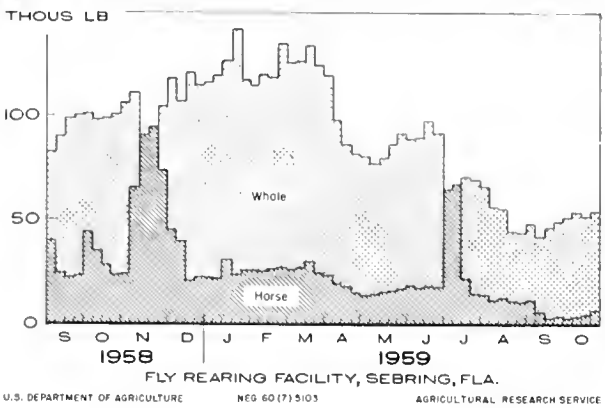
All livestock entering the Southeast from the Southwest must be unloaded and inspected at one of the stations. All wounds on livestock are treated with an approved smear. This is followed by thorough application of an organic phosphorus insecticide to all animals except those specifically exempted. A number of screwworm-infested animals have been intercepted and treated at these stations before being permitted to enter the Southeast.

N 22019

Larvae of screwworm in wound.

State–Federal Screwworm Eradication Program

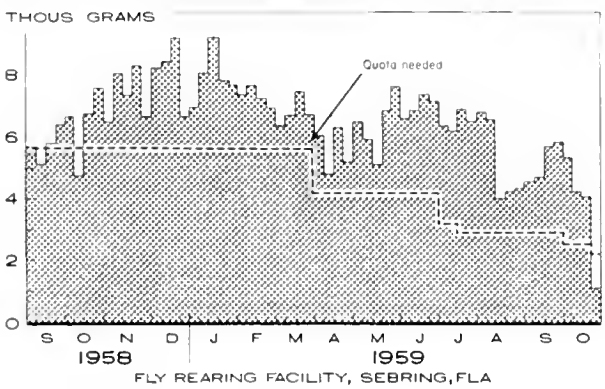
HORSE-WHALE MEAT CONSUMPTION



U.S. DEPARTMENT OF AGRICULTURE NEG 60(7)5103 AGRICULTURAL RESEARCH SERVICE

State–Federal Screwworm Eradication Program

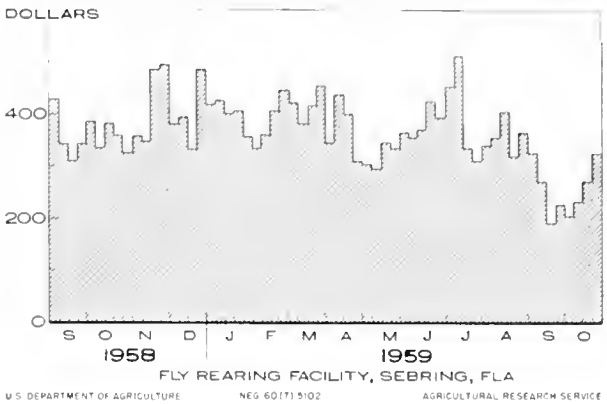
EGG PRODUCTION



U.S. DEPARTMENT OF AGRICULTURE NEG 60(7)5100 AGRICULTURAL RESEARCH SERVICE

State–Federal Screwworm Eradication Program

MEAT COST PER MILLION FLIES



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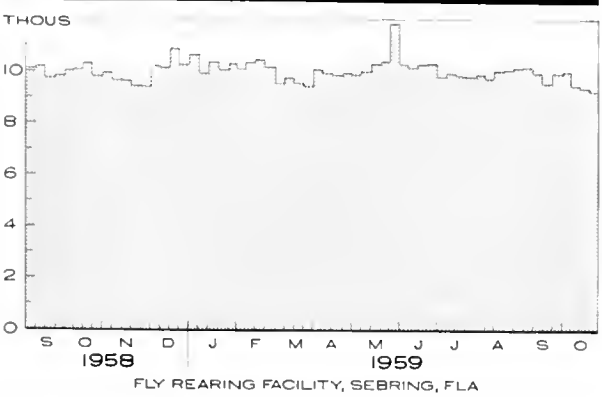
State–Federal Screwworm Eradication Program

PUPAE PER LITER



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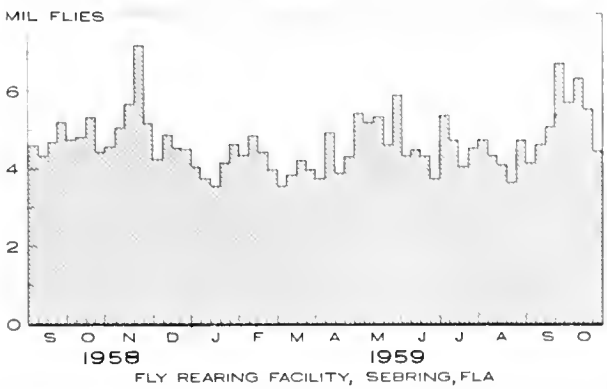
State–Federal Screwworm Eradication Program

FLIES RELEASED PER 10,000 LB. OF MEAT



U.S. DEPARTMENT OF AGRICULTURE NEG 60(7)5104 AGRICULTURAL RESEARCH SERVICE

During the warm months, when screwworms can establish themselves in the North and Midwest, livestock from those areas are inspected to prevent screwworm-infested animals from entering the eradication area. Air, rail, and ocean shipments of livestock also must be certified free of screwworms before they are permitted to enter the eradication area.

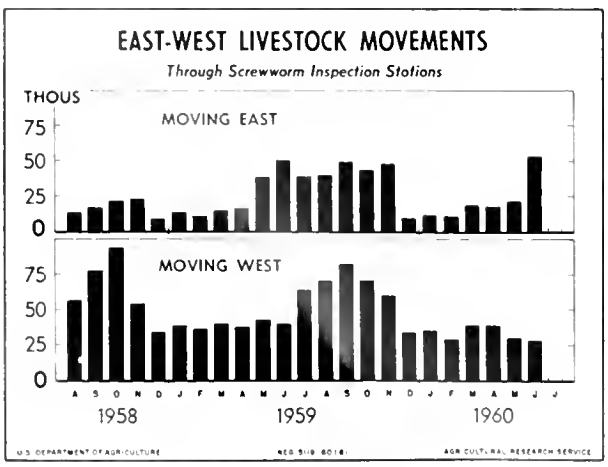
During the late summer and fall of 1958 and 1959 screwworms succeeded in establishing themselves in several Mississippi counties adjoining the Mississippi River. Probably these infestations were started by flies entering the eradication area from Louisiana or Arkansas under their own wing-power. The outbreaks were controlled by intensive animal inspections, treatments, and State quarantines.

Looking ahead in eradication

The success of the eradication program in the Southeast has stimulated considerable interest among livestock growers and others in the Southwestern United States.

During 1959, a screwworm survey was made in the Southwestern United States and Northeastern Mexico to learn more about screwworm habits and to evaluate the practicability of using the sterile-fly technique in those areas.

The survey in Mexico failed to reveal any natural barriers comparable to the water barrier that encloses, on three sides, the screwworm overwintering area in Florida. An eradication effort would not be practicable without a perpetual program to prevent reinfestation of the Southwestern United States through the migration of screwworm flies northward from Mexico.



The vast territory involved, the climatological and topographical differences from the Southeastern United States, and the need for additional information, indicate that any joint United States-Mexican program should first be directed toward research, field trials, and methods development.

CATTLE FEVER TICK

A tale of ticks

The theory is that cattle tick fever spread to the Southern United States from the West Indies and Mexico. The earliest report of the disease in this country was made in 1796. In the middle 19th century, there were frequent reports of the infection in the South and Southwest.

The nature of the disease was not understood until 1889, when scientists of the U.S. Department of Agriculture discovered that the causative agent was a protozoan, *Babesia bigemina*, transmitted by the cattle fever tick (*Boophilus annulatus* and *Boophilus microplus*). The first step in control of the disease was to quarantine the infested area. The order controlling movement of southern cattle was issued on July 3, 1889.

By 1907, cattle tick fever (bovine piroplasmosis, Texas Fever, splenetic fever) was prevalent in the Southern States, and had been reported in California, Kentucky, Missouri, Oklahoma, and Virginia. Except for a narrow buffer zone along the Texas–Mexican border and sporadic reinfestations in other places, the Tick Eradication Program had eliminated fever ticks from the United States by December 1943.

All Mexican territory adjacent to the international boundary along the lower Rio Grande River is tick infested. Reinfestations in Texas by tick-infested Mexican animals illegally entering the United States occur regularly. The river boundary is not an effective barrier

against illegal movements or stray animals. The buffer area under Federal and State quarantine extends 500 miles from Del Rio to the Gulf of Mexico. This zone is patrolled constantly by Department inspectors in cooperation with Texas livestock sanitary authorities. The area under quarantine includes parts of Cameron, Hidalgo, Kinney, Maverick, Starr, Val Verde, Webb, and Zapata Counties.

The cattle fever tick was eradicated from California many years ago. However, this State also has a common border with infested areas in Mexico, and animals illegally entering the United States reintroduce ticks from time to time.

In October 1941, fever tick infestation was discovered adjacent to the Mexican border in the Tijuana Valley of San Diego County and on a few farms in Los Angeles County to which cattle had been moved from San Diego County. Infested areas were quarantined and cattle were systematically inspected and dipped. Infestations in small areas in San Diego County were also reported in 1943, 1944, 1949, and 1950. In each instance the ticks were eradicated by following customary procedures.

The most recent infestation in San Diego County was in Marron Valley in June 1956. A State hold-order was placed on the affected area, and an inspection and dipping program inaugurated. No additional ticks were found after official dippings were started, and the hold-order was lifted in June 1957. A double fence was constructed across the valley. Plans were made to chute-inspect cattle and horses in Marron Valley periodically at least four times a year.

In Puerto Rico a tick eradication program, in operation for a number of years, is coming to an end. Here the tropical variety of the fever tick was prevalent, and it was necessary to treat sheep and goats as well as equines and cattle.

Troublesome ticks in Florida

Florida was the last State, aside from Texas, to be freed of fever ticks. The Federal quarantine in Collier and Hendry Counties in the Big Cypress Swamp area was lifted in December 1943.

Deer, which served as hosts for the tropical tick, delayed final eradication. It was only after the Florida Legislature provided authority to eliminate this host that the vector was eradicated.

In 1947, slight infestations were found in Broward, Charlotte, Collier, Dade, Hendry, Lee, and Palm Beach Counties. Systematic eradication efforts continued during 1947 and 1948.

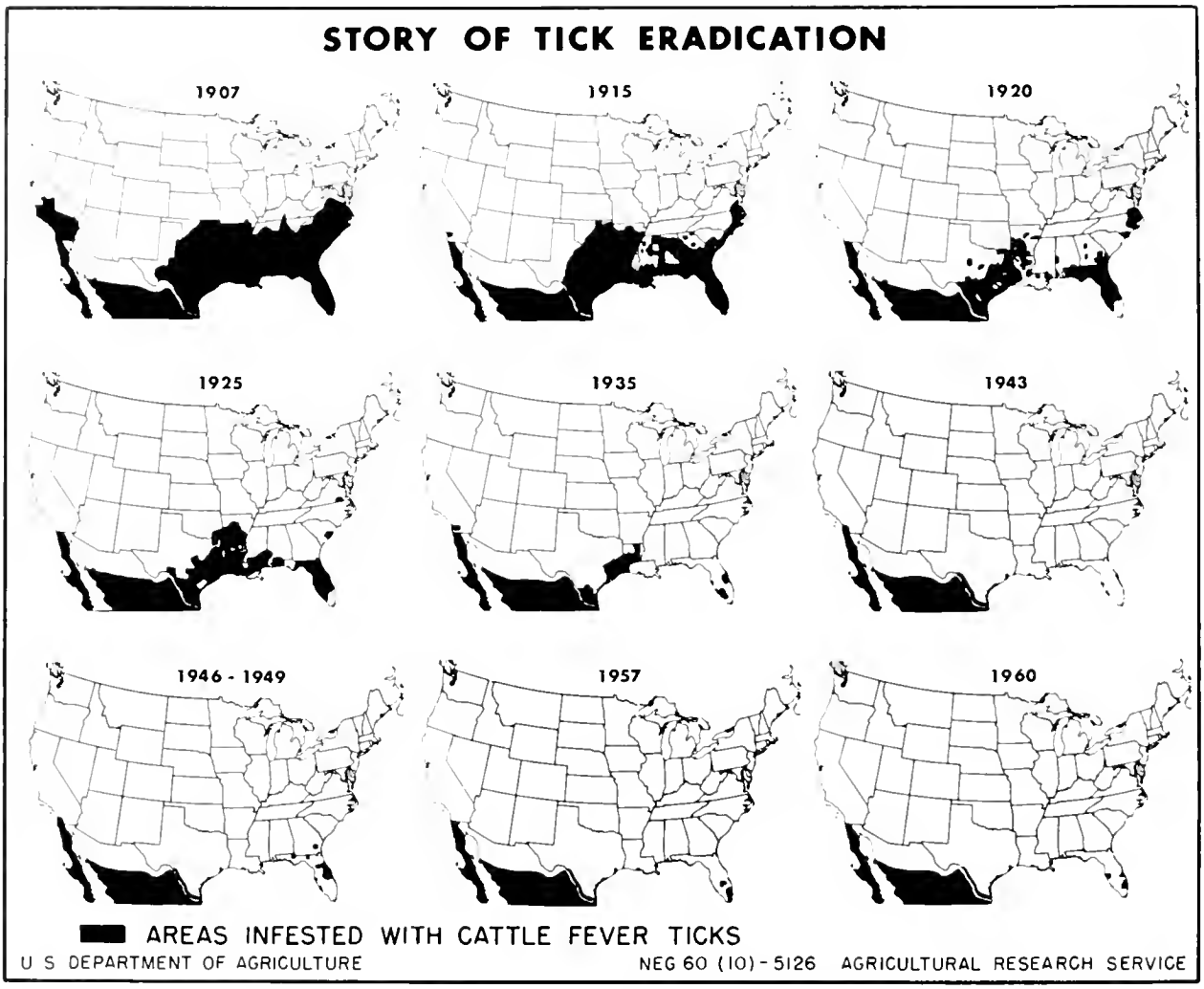
In October 1948, a heavy infestation of ticks was discovered in Volusia County. Investigation of this outbreak disclosed additional infestations in Alachua, Brevard, Flagler, Jackson, Lake, Madison, Orange, Osceola, Putnam, and St. Johns Counties in Florida and on one premise in Brantley County, Ga. All these infestations were caused by movement of cattle from Volusia County.

Systematic inspection and dipping brought the outbreak under control, and all remaining Federal quarantines were removed in December 1950. No additional infestations were found until 1957.

On April 23, 1957, a State inspector found cattle fever ticks at the Okeechobee Livestock Market at Okeechobee, Fla. The ticks were identified as *Boophilus microplus*. This was the first outbreak of fever ticks in Okeechobee County since the winter of 1945, when quarantines were placed on that county and on Glades, Highlands, and parts of Osceola and Polk Counties.

Since the 1945 infestation in Florida, cattle passing through all auctions in the State had been examined for ticks by experienced inspectors, and all cattle except those selling for slaughter had been dipped. It was as a result of this routine check that the ticks were found on cattle from two Okeechobee ranches.

Immediate steps were taken to treat infested and exposed herds and place a State quarantine on the area likely to be affected. Action was also taken to trace animal movements in and out of the area during the previous 2 or 3 years, to place the premises involved under State quarantine, and to investigate the possible source of the ticks. In all, more than 100 ranches in 10 Florida counties were quarantined. Counties involved were Broward, Dade, Glades, Hendry, Martin, Highlands, Okeechobee, Palm Beach, and St. Lucie. Premises un-



der State quarantine included those to which cattle had been moved from ranches where ticks were discovered and also premises that had supplied cattle to ranches known to be infested.

Additional experienced State and Federal tick inspectors were assigned to the eradication project. During the summer of 1957, 8 infested herds were found in Okeechobee County, 3 in Broward, 2 in Highlands, and 1 each in Dade and Palm Beach Counties. The campaign ended successfully in September 1958, more than a year after the last known infestation.

Tick fever status today

On May 31, 1960, a State inspector again found *Boophilus microplus* on cattle at the Okeechobee Livestock Market. The lot of 21 cattle had been trucked from Palm Beach County. Additional infested cattle were found in the herd of origin. The Animal Disease Eradication Division cooperated with the State of Florida in instituting a vigorous eradication program. Tick inspectors traced movements from infested areas and began the inspection of cattle and horses throughout central and southern Florida. Many owners spray their cattle regularly, which makes it difficult to find ticks.

Sixteen infested herds were reported in the following Counties: Palm Beach 10, Martin 4, Hillsborough 1, and Indian River 1.

A triangular area of approximately 600 square miles including parts of Palm Beach and Martin Counties was placed under State

BN-12794

Inspectors closely examine infected and suspect animals for evidence of cattle fever ticks.

quarantine. Infested and exposed herds in other areas were also quarantined.

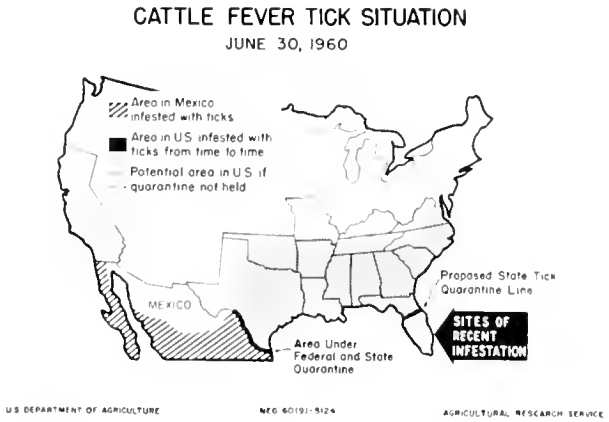
During 1960, 91 Mexican livestock were caught in the Texas-Mexican buffer area by tick inspectors; also, 31 native American livestock that had strayed into Mexico were caught on their return. Of the Mexican livestock, 41 were horses of which 3 were found to be tick infested, and 50 were cattle of which 31 were infested. Also, animals in 4 United States herds were found to be infested, and 21 herds were held for further treatment. In 1960, 12,435 certificates were issued for the intrastate movement of 76,659 livestock from the area. In addition, 172 certificates were issued for the interstate movement of 21,390 livestock. Also 48,151 herds of 1,045,876 livestock were inspected for ticks, and 9,938 herds of 53,790 livestock were dipped.

Plans for the future

Effective July 1, 1960, a Federal quarantine was placed on Hillsborough, Martin, and Palm Beach Counties.

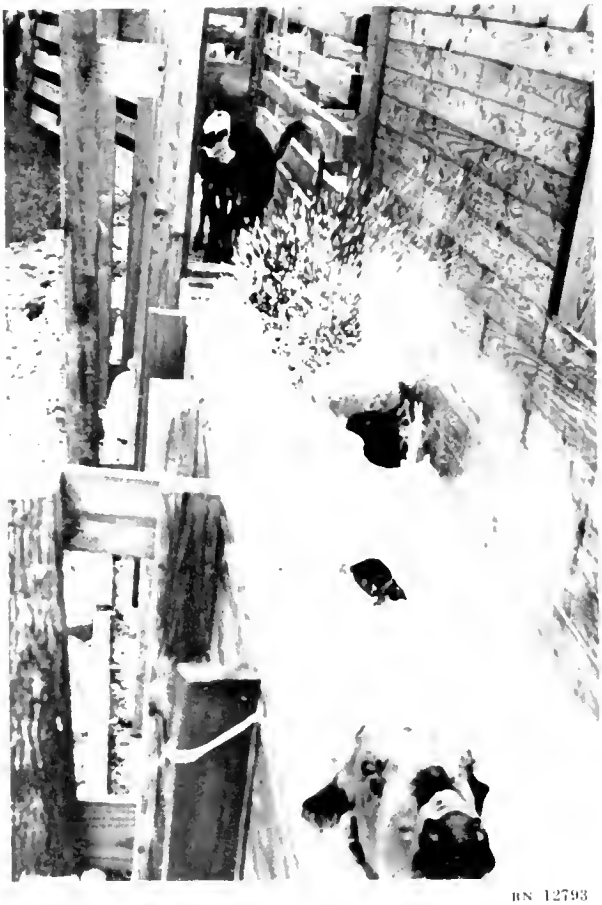
The eradication program includes establishing a State tick quarantine line crossing Florida at Ocala. This is identical with the former screwworm quarantine line established in May 1958 and discontinued November 1959. Florida regulations require inspection and dipping of animals moving north across the line. All cattle and horses are systematically inspected south of the line. The program also includes inspection of cattle at slaughter houses and inspection and dipping of cattle at auction markets.

In a tick-eradication program, the pest can be attacked in two locations—in the pasture and on the cattle. Animals may be freed of ticks in one of two ways—by treating with a tickicide that destroys the ticks, or by pasturing at proper intervals on tick-free fields until all the ticks have dropped. Dipping is the method generally used. The pasture-rotation method is more complicated and tick-free fields are seldom available.



In freeing pastures, the method followed may be either direct or indirect. In the direct method, cattle, horses, mules, and other host animals are excluded from pastures until all ticks have died of starvation. This plan is seldom followed because owners are reluctant to give up even temporary use of pastures. In the indirect plan, cattle and other animals remain on infested pastures but are treated with tickicides at regular intervals to prevent engorged females from dropping and reinfesting the field.

All seed ticks on the pastures, or those that hatch from eggs laid by females already there, eventually die. Those that get on the cattle from time to time are destroyed by the treatment. Those in the pastures that fail to find a host starve to death.



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Dipping cattle for tick eradication

TUBERCULOSIS

The road to eradication

The American consumer has enjoyed increased freedom from the danger of acquiring tuberculosis from animal products since the inception of the cooperative State-Federal program in 1917. The considerable reduction in slaughtering plant condemnations due to tuberculosis bear out the progress of field efforts to eradicate the infection.

When the program was initiated, about 5 percent of the cattle in the country were tuberculous. The disease was causing approximately 50,000 whole beef carcasses, and an even greater number of swine carcasses, to be condemned annually as unfit for human consumption. This was equivalent to a 20-mile-long trainload of live animals. The number of whole beef carcasses condemned in 1959 was 91.

The number of reactors found throughout the United States declined steadily from the advent of the program until a low point in disease incidence was reached in 1952. The infection rate in 1952 was 0.11 percent of all cattle tested, or 11 in every 10,000.

In spite of the impressive drop in infection rate since the start of the program, tuberculosis has yet to be eradicated. During 1953 and 1954, the percentage of reactors remained the same as in 1952.

Beginning in 1955, the number of reactors in some areas of the country began to increase until in 1959 a total of 23 of every 10,000 cattle tested were identified as reactors.

It is apparent that eradication of tuberculosis—and elimination of the last tuberculous cow—is still a formidable problem. To wipe out this menace to the livestock industry and to public health, the Division is pursuing a broad program of attack.

A year of increasing activity

During 1960, greater awareness of the need to completely eliminate tuberculosis resulted in increased attention to the following aspects of the program: (1) Training in uniform testing techniques; (2) more effective tracing procedures to locate exposed cattle; (3) greater emphasis on field study projects; (4) additional work in laboratory diagnostics; and (5) training in post-mortem examination.

Training in uniform testing techniques

National conferences and tuberculosis workshops have afforded opportunities for further training of field veterinarians in the use of proper equipment and approved techniques in the uniform application and interpretation of the tuberculin test. Division personnel have conducted annual testing demonstrations for seniors at colleges of veterinary medicine. This phase of the program provides qualified personnel for continued improvement of the eradication effort.

More effective tracing procedures

An important adjunct to the regular testing program is the location of infection by tracing

N 33624

Making the tuberculin test.

infected and exposed animals to the herds of origin. This involves—

(1) Tracing to herds of origin animals found with lesions of tuberculosis on regular kill at slaughtering plants.

(2) Tracing the origin of reactor animals found in tuberculin tests.

(3) Tracing and follow up on exposed animals associated with infected herds.

Success of the tracing system depends upon close cooperation of many individuals—the veterinary meat inspector, the stockyards veterinarian and stockyards officials, the livestock hauler, the livestock market operator, State and Federal livestock sanitary officials and their respective field veterinarians, the veterinary practitioner, the livestock dealer, and the livestock grower. Greater efficiency in tracing operations are borne out in figures for the 5 years 1955-59, during which 72,005 tuberculosis reactors were slaughtered. Of these, 5,539 or a total of 7.6 percent were found as a result of tracing to herds of origin animals with lesions reported on regular kill. These reactors were found by testing 164,824 cattle, or only 0.38 percent of the 43,922,211 cattle tested during the 5-year period. It is anticipated that an even greater percentage of cases will be traced as better identification and more complete record systems are developed.

Emphasis on epidemiology (field study projects)

Epidemiology in tuberculosis has received increased attention. In cattle this involves other species of animals, as well as man, as potential sources of infection.

As the incidence of tuberculosis in cattle has been reduced, the close study of the interspecies relationship of the various types of tuberculosis has become increasingly important. Avian and human tuberculosis, for example, must be considered in disclosure of possible sources of infection to cattle.

Special field investigations being conducted in cooperation with State officials may aid in developing still more effective procedures.

Additional work in laboratory diagnostics

As increased study and attention is given to the epidemiological aspects of tuberculosis, laboratory and diagnostic work has increased. Specimens from reactor animals in problem herds are processed through the laboratory, where tissues are examined pathologically and bacteriologically. This type of work in diagnosis of tuberculosis is among the most involved and time-consuming of medical diagnostic procedures. However, as comprehensive investigational studies are made, the laboratory becomes increasingly important in determining the type of tuberculosis involved.

Training in post-mortem examinations

The Meat Inspection Division has developed a guide that provides specific instructions and information on post-mortem examination of tuberculosis reactors.

This guide makes possible the uniform examination of all tuberculosis reactors, whether their slaughter is supervised by municipal, State, or Federal inspectors. Special training, under the direction of the Meat Inspection Division, has been given to ADE veterinarians to achieve uniformity in the post-mortem examination of tuberculosis reactors.

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Inspectors follow uniform post-mortem procedures when examining carcasses of tuberculous reactors.

Tuberculosis forecasts

Progress has been made. But much remains to be done.

The increasing interest and support being given by the cooperating States is encouraging. Division activities in epidemiological studies, laboratory work, and case-finding techniques will be continued.

Close cooperation with research workers in both animal and human medicine will hasten the development and use of new and improved diagnostic tools.

The support and cooperation of State and Federal officials, the veterinary profession, public health agencies, research workers, livestock producers, and consumers will enable continued improvement to be made.

The goal is: Eradication of bovine tuberculosis from the United States.

EMERGENCY DISEASE ACTIVITIES

The former Bureau of Animal Industry was organized in the U.S. Department of Agriculture to deal with an animal disease emergency, contagious bovine pleuropneumonia. The Bureau became world famous for the tenacious application of slaughter and quarantine procedures that resulted in the eradication of contagious pleuropneumonia and several outbreaks of foot-and-mouth disease. These same principals were used more recently by the Animal Disease Eradication Division in eradicating vesicular exanthema.

Planning for emergencies

The Division is now responsible for continuing the development of plans for stamping out any foreign animal disease that may gain entrance into this country. Such plans must be workable, realistic, and documented for ready use. The planning process is a continuing one.

A manual, "Emergency Animal Disease Eradication Guide," was completed and distributed to each State in March 1960. It covers both technical and administrative aspects of an emergency disease eradication operation. Through continual revision of this loose-leaf manual, a practical, up-to-date guide for emergency disease operations will always be available.

The United States is fortunate in being free of several livestock diseases that are enzootic in other parts of the world, such as foot-and-mouth disease, rinderpest, African swine fever, and Rift Valley fever. These diseases are very destructive and result in great losses in countries where they exist. Freedom from such diseases makes possible more economic production; and economic production makes for greater availability of meat for consumption. Maintenance of freedom from disease lies in planning and preparation for animal disease emergencies.

Diagnostic personnel and facilities

Since 1950, 50 Division veterinarians have received special training in the diagnosis of foreign animal diseases, particularly the vesicular diseases. The veterinarians are available for consultation in any part of the country.

The Division maintains a diagnostic laboratory at Beltsville, Md. This facility will be transferred to the National Animal Disease Laboratory, at Ames, Iowa, when it is com-

pleted. The Plum Island Laboratory of the Animal Disease and Parasite Research Division is also available for assistance in diagnosis. Statutory prohibition exists against the importation of foreign animal disease producing agents to any point in this country except Plum Island. For this reason many of the tests for such diseases can be conducted only at that laboratory.

Vesicular diseases

During 1960, 64 reports of suspected vesicular conditions were received in Washington. Each of these cases was investigated and serum or tissue specimens were submitted for laboratory tests. A positive diagnosis of New Jersey type vesicular stomatitis was made in 21 of the 64 cases. In each case in which the diagnosis was negative, the herd or animal involved was regularly reinspected until it could be satisfactorily determined that the condition was not vesicular. Each tissue specimen received was checked by complement fixation test against the seven known types of FMD antisera, with negative results.

Foot-and-mouth disease

With the exception of North America, Central America, Australia, and New Zealand, foot-and-mouth disease is considered to be enzootic in the major livestock countries of the world. The disease has been known for more than 100 years. It was not until the latter part of the 19th century, however, that its economic importance was fully realized.

There have been nine outbreaks of foot-and-mouth disease in the United States. Not the last, but perhaps the worst, struck in 1914. It started in Berrien County, Mich., in August of that year. For reasons explainable only by lack of alert and trained diagnosticians and an inadequate emergency disease reporting system, the disease went undiagnosed until October 15.

The Union Stockyards in Chicago were quarantined on October 28, and the machinery of eradication finally moved into gear. But before the emergency ended, on June 5, 1916, havoc and death had spread to the livestock industry of 22 States. Nine million dollars had been spent; 172,222 cattle, sheep, swine, and goats had been sacrificed.

Vesicular stomatitis

The dust from the foot-and-mouth disease campaign had hardly settled when "the event of greatest consequence" in 1917 unfolded.

From the concentration remount station near Chicago, came word of a disease of the mouths and tongues of horses. The disease was traced to similar remount stations at Grand Island, Nebr., and Denver, Colo., where thousands of horses and mules had been gathered for shipment to the armies of France and Britain.

Sick animals were immediately isolated, quarantined, and treated. Infected pens were cleaned and disinfected.

Then, a carload of horses from Nebraska arrived at Denver. Several animals were rejected and returned. Four days later the rejected animals had developed lesions that quickly spread to horses and cattle on neighboring ranches. And before anyone was fully aware of what was happening, inspectors at Kansas City were reporting lesions resembling foot-and-mouth disease in cattle shipped from Nebraska.

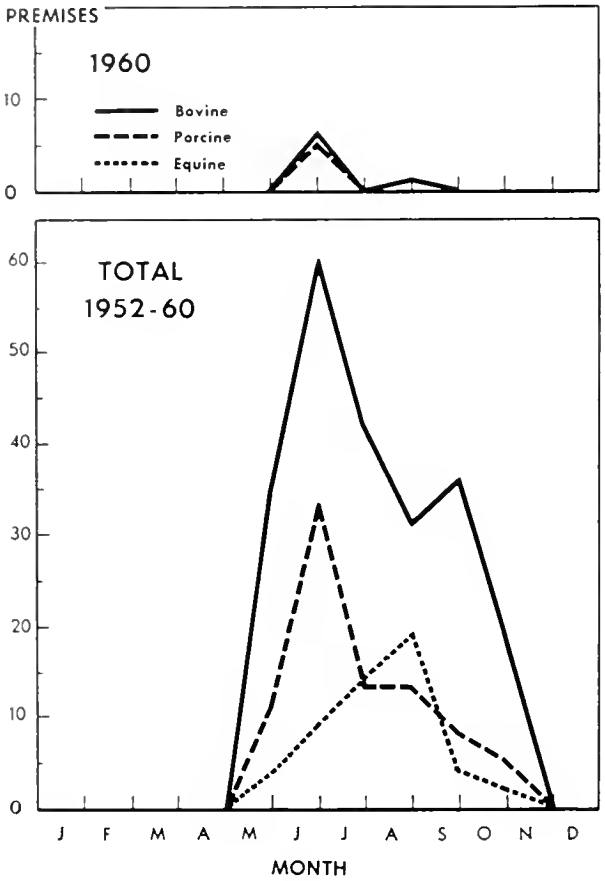
The lesions were diagnosed as those of vesicular stomatitis (VS), a disease well known in Europe and South Africa, but up to that time only occasionally noted in the United States. Before it was controlled, VS had spread from Nebraska and Colorado to ranches and remount stations in South Dakota and Wyoming, and through the usual trade channels to the Atlantic Coast and to France.

In 1917, a prompt and exact differentiation in cattle between foot-and-mouth disease and vesicular stomatitis was accompanied by many difficulties. Not least among them was the awareness that a mistaken pronouncement could lead, on the one hand, to unnecessary and serious economic disturbances and, on the other, to the spread of one of the most dread and readily communicated animal plagues.

Vesicular stomatitis is endemic in certain parts of the United States and Mexico. It has occurred sporadically in some parts of Central and South America. In this country, the disease seldom occurs in winter. It appears annually during the warmer months in the coastal

INCIDENCE OF VESICULAR STOMATITIS

Confirmed by Laboratory



plains areas of Georgia, Louisiana, North Carolina, and South Carolina. Sporadic outbreaks occur in other States.

The clinical similarity between VS, foot-and-mouth disease, and vesicular exanthema makes early diagnosis essential. Laboratory tests, animal-inoculation tests, or both, are necessary for a positive diagnosis.

It is difficult to maintain interest in reporting vesicular conditions in the VS-endemic areas. Livestock owners and practicing veterinarians become so accustomed to seeing lesions that an apathy toward reporting develops. There is danger, therefore, that either foot-and-mouth disease or vesicular exanthema will not be reported immediately if it should appear in a VS-endemic area and its spread would be uncontrolled. A continuing campaign to emphasize the necessity of early reporting of all vesicular lesions is essential.

Vesicular exanthema

Vesicular exanthema (VE) is a disease of swine characterized by formation of vesicles in the mouth and on the snout and feet. The teats and udders of sows may also be affected. Clinically, VE cannot be distinguished from foot-and-mouth disease and vesicular stomatitis. VE, which had not been previously diagnosed in any other part of the world, first appeared in California in 1932, where it remained confined for 20 years. In 1952 and 1953, the disease spread to 42 States and the District of Columbia. The first appearance of the disease outside the State of California was at a garbage-feeding premise in Wyoming. Sixty days prior to the outbreak the owner started feeding raw garbage from trains originating in California.

The time-tried eradication measures of inspection, prompt reporting, diagnosis, slaughter, cleaning and disinfecting, and testing of premises, together with cooking of garbage, made possible the eradication of VE. Its complete eradication from the United States was announced by the Secretary of Agriculture in October 1959.

Present program

With the announcement of the eradication of VE came immediate requests for cessation of inspection of garbage-feeding premises and garbage-fed swine. The knowledge gained during the eradication program, however, clearly indicates the importance of garbage cooking to control swine diseases. In most areas, regular periodic (but less frequent) inspections of garbage-feeding premises and garbage-fed swine are being maintained.

Search for a laboratory test

When VE was eradicated, it became a disease foreign to the United States. Research within the continental limits was discontinued and all VE virus was either destroyed or shipped to the Plum Island Laboratory. Research at Plum Island will continue in an effort to develop a laboratory test for VE and

to learn more about the disease and its effect on swine.

ANAPLASMOSIS

The early account

Anaplasmosis is an infectious and transmissible disease of cattle that apparently has been in this country for many years. Some have theorized that it was introduced with the first cattle brought by the Spaniards.

Theobald Smith and Fred L. Kilborne in 1893 made first mention of the disease in their report on the cause and transmission of Texas cattle fever. Frequently encountering another entity, they questioned whether they were dealing with Texas fever alone or with two distinct diseases.

In 1910, Arnold Theiler, in South Africa, presented evidence that two diseases were involved, piroplasmosis and another which he named, anaplasmosis. K. F. Meyer, in 1913, confirmed observation of anaplasma-like bodies in California cattle. Thereafter, little attention was given to the disease. Most people believed that it would be controlled with the eradication of the fever tick. However, in 1926, Darlington reported that although anaplasmosis was a troublesome disease in southeastern Kansas, he had failed to find fever ticks on infected animals. This was the first indication that eradication of the fever tick might not eliminate anaplasmosis. Much has been learned since then.

Nature of the agent

The causative agent of anaplasmosis is *Anaplasma marginale*, a parasite that destroys the red blood cells of infected animals. Research workers are not in complete agreement as to the nature of the agent. During recent years, a number of investigators have tried to show that it is a filterable virus; however, their work has been either negative or inconclusive.

Recently, Espana and coworkers reported that examination by phase contrast and electron microscopy of hemolyzed erythrocytes from infected cattle showed the parasite to be more complex than was generally believed. Ring, match, comet, and dumbbell-like forms were observed. They found *Anaplasma marginale* to be motile, a property not previously described. This may be important in classifying the parasite as well as explaining the mechanism of cell penetration and the typical marginal position. They believe it is justifiable to consider *A. marginale* a true parasite, probably belonging to the Protozoa.

Antibiotics and insecticides

Weapons have not yet been developed for planned eradication or control of the disease and anaplasmosis still costs the cattle industry millions of dollars annually. Some progress has been made in combating bovine anaplasmosis on a herd basis. It was found that several broad-spectrum antibiotics inhibit the organism. Development of the complement-fixation test has given one of the best tools for identification of infected or carrier animals. Encouraging results in stemming transmission of the disease by control of vectors have also been obtained through the systematic use of insecticides on infected herds.

Anaplasmosis can be treated. But if tetracycline antibiotic therapy is to be used beneficially, it must be given early in the period when anaplasma bodies are increasing in number. The antibiotic suppresses formation of additional bodies. Blood transfusions are indicated during the period of anemia and especially before the crisis is reached in RBC destruction.

Ticks in the west; flies in the south

The anaplasmosis syndrome is similar wherever the disease occurs. However, the vectors thought to be chiefly responsible for the transmission of the disease in the Southeast are different from those in the West. In the Rocky Mountain and West Coast Regions, the natural vectors of primary importance are believed to be the spotted fever tick (*Dermacentor andersoni*), and the Pacific Coast tick (*D. occidentalis*); biting insects are considered of secondary importance. In the Southeast, horseflies and mosquitoes are believed to be the primary vectors. Natural wild animal reservoirs have not been implicated in this region as have deer in California.

Prospects for controlling or eradicating anaplasmosis are less encouraging in the Western States than in the Southeast since the causative agent can survive longer in the body of a tick than in a fly or mosquito. It also has been shown that anaplasmosis may be transmitted from one generation of ticks to the next and then into a susceptible bovine host.

The key to control

Since the infection is easily spread by mechanical transfer of infected blood, man, through carelessness in performing blood-letting operations, becomes an important potential agent of conveyance. Prevention of natural, mechanical disease transmission is the key to control. This, in turn, is conditioned by four factors: (1) The infectivity level of the blood of carrier cattle; (2) the biting insect vector density population for any given area; (3) the lapse of time between insect feeding on infected and susceptible cattle; and (4) precautions against carelessness in blood-letting operations. Control of any of these factors has an immediate, favorable effect on reducing the disease transmission rate.

In certain areas of the country, herds have been cleared of the disease by application of the complement-fixation test and segregation or disposal of reactors. If segregation is practiced, carrier or reacting animals should be sufficiently removed from the susceptible group to insure that interrupted vector feedings are not resumed on the susceptible animals.

These practices have been found feasible in Virginia, and the State is offering a voluntary program to livestock owners. Suspect herds are tested and owners given the choice of removing reactors for immediate slaughter or holding them under segregation pending slaughter. A similar project on a limited scale is being offered in Tennessee. No indemnity is paid under the voluntary programs.

Halting the disease in Hawaii

Hawaii has had a program since November 1955. It was initiated as a pilot project to see if anaplasmosis could be eradicated by use of the complement-fixation test. The essentials of the program are—

(1) Application of the complement-fixation test for the detection of carrier animals.
(2) Identification and immediate slaughter of positive animals.
(3) Testing of herds (including all cattle 2 months of age and over) at not less than 60-day intervals until two negative tests are obtained.
(4) Testing of blood samples collected from all cattle slaughtered in the Islands to detect foci of infection.

Since anaplasmosis was brought to the Islands by importation of carrier animals from the mainland, only animals negative to the complement-fixation test are now permitted entry. Cattle must pass two negative tests—one before shipment from the mainland and a second on arrival, before release from quarantine. They are retested 60 days after introduction into a herd. In the absence of a serious vector problem, Hawaii officials believe that their program provides a practical means of eradicating anaplasmosis.

Field trials in Mississippi

In January 1959, field trial studies were started in the Delta Region of western Mississippi. The situation there is different from that in the Hawaiian Islands, in that biting insect populations build up during the warm months from spring to fall. Of the nearly 15,000 head of cattle tested in 79 herds in 16 counties, slightly more than 60 percent of the animals were classed as reactors or suspects. Individual herd incidence patterns varied from no reactors in a few herds to almost 100-percent reactors in several herds.

Unfortunately, because of lack of funds, it was necessary that owners pay for the collection of blood samples. Hence, herd retests generally were not made at desired intervals during the nonvector winter months. Nevertheless, overall results, from the standpoint of reduction of losses from anaplasmosis and new transmission, were encouraging.

During the summer of 1959, there were fewer losses in herds in which control measures were practiced than there had been the previous year. Some clinical cases appeared in the susceptible segregation groups. But in

every instance, it was shown that sufficient testing had not been done to insure that all carrier cases had been removed prior to the vector season. Clinical cases and death losses were extensive in the nonsegregated and nontested herds in the area. This indicated that conditions for natural spread of the disease were present.

Several herds in the area are being studied for the effects of insecticide and antibiotic control. Preliminary findings indicate that regular use of insecticides and antibiotic feeding support the segregation program.

Trials to continue

Field trial studies in the Delta Region will be continued until more detailed recommendations on control can be made. Research and field studies will also be continued in the sections of the country where ticks are the primary vector.

Where anaplasmosis is not too prevalent and the natural vectors of primary importance are biting insects, the disease can be controlled by application of the complement-fixation test, removal of reacting carrier animals by segregation or slaughter, and proper herd management practices.

CATTLE GRUBS

Cattle grubs, also called "warbles" or "wolves," are the larval stage of the heel fly or warble fly. This pest of economic importance has plagued domestic animal producers throughout recorded history.

The two species present in this country—*Hypoderma lineatum*, the common cattle grub, and *H. bovis*, the northern cattle grub—were probably imported with the first cattle brought in by the early American settlers. Their subsequent spread paralleled movement of cattle accompanying settlers during their westward migration.

The common cattle grub is found throughout the United States. The northern grub, formerly limited to the Northern States, is gradually spreading south.

The grub story

The two species have a similar life history. Eggs are attached near the base of the hair on the host. The adult of the northern species deposits her eggs singly. Her buzzing approach panics cattle, and the fly in pursuit strikes the thighs and the rump. The adult of the common species—more stealthy in its approach—manages to place several eggs on the heels or the underside of the host.

Eggs hatch in 3 to 6 days and the newly hatched larvae penetrate the skin. They migrate through the host to the gullet, diaphragm, and abdominal viscera. Nine months after penetration of the host the grubs appear under the skin of the animal's back. They come to rest near the median line between the shoulders and hips, cut a breathing hole through the skin, and encyst. The injury at this site is considered most damaging by the leather industry.

Soon after the larva reaches the back, it molts into the second instar. During this stage, which lasts about 3 weeks, the larva grows and causes considerable tissue inflammation, usually accompanied by pus, in and around the cyst. A second molt follows, and the larva enters the third and final stage of its developmental period. After some 20 days, the mature larva emerges from the cyst and falls to the ground. It crawls under a protective object and pupates.

The pupal period lasts from 16 to 75 days, depending on temperature and humidity. At the end of this period, the adult fly emerges from its pupal case and immediately seeks a mate. Adults do not feed, and egg laying promptly follows mating.

Losses

Livestock Conservation Incorporated reports annual losses from cattle grubs of over $55 million to growers and feeders; $32 million to the tanning and leather industry; and $13 million to the meat packing industry—a total of more than $100 million annually.

Control

The effectiveness of rotenone in controlling cattle grubs has long been recognized. Some workers rate it at a little less than 80 percent as compared with the 85- to 90-percent effectiveness claimed for more recently developed

organic phosphate systemic insecticides. The latter have been used extensively in field trials during the past few years with encouraging results.

The future

The National Cattle Grub Committee reports as follows: "Research in grub control now underway and recommended includes a study of the ecology and life cycle of the parasite in various regions, effects of movement of cattle from one climate to another on the life cycle of grubs, the apparent resistance of older cattle to grubs, and the possibility of induced immunity to grubs."

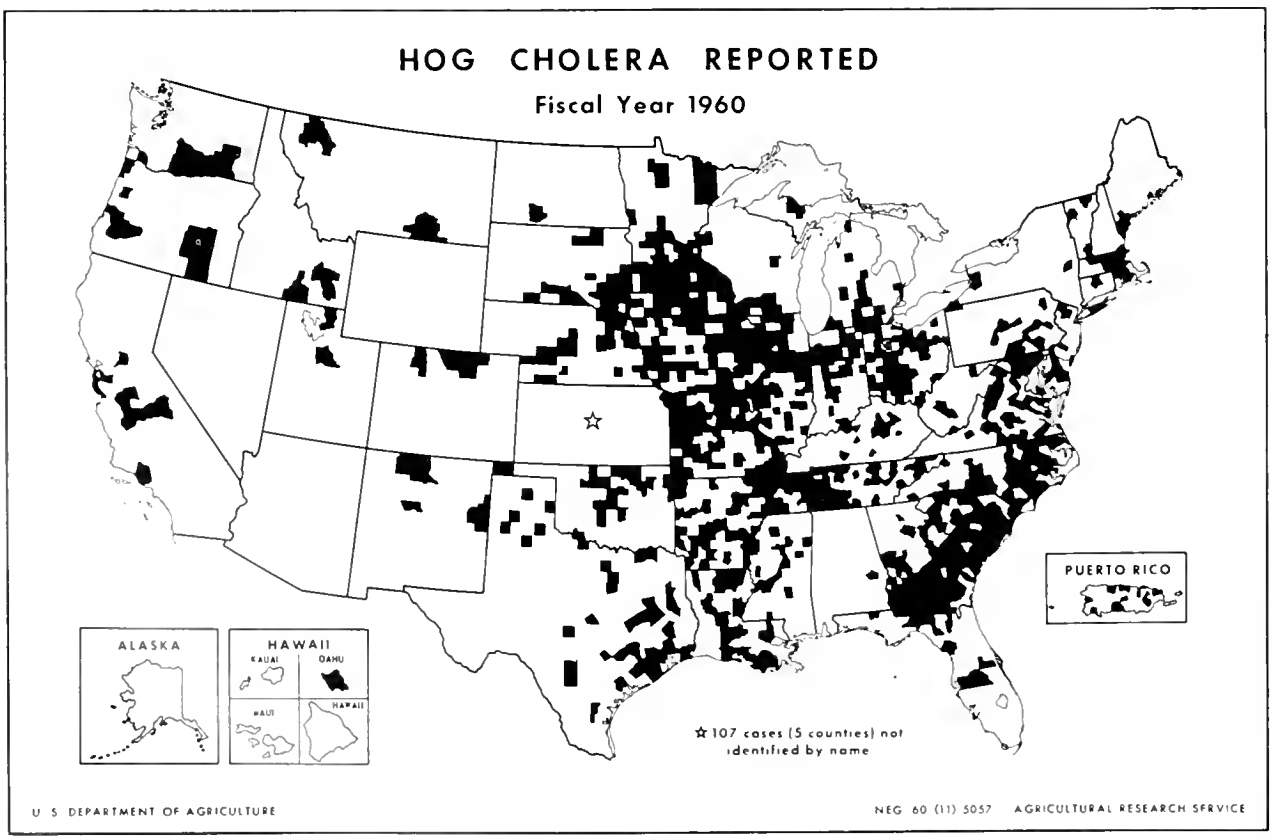
The Animal Disease Eradication Division does not envision a national cattle grub eradication program in the immediate future. However, available reports on each new development in research and field trials are constantly examined and analyzed in light of possible application to cattle grub eradication.

HOG CHOLERA

The cholera chronicle

Hog cholera is reported to have been in this country since the early 1830's. Some reports indicate that it was here before then. During the latter part of the 19th century it devastated the swine population of the country. As late as 1913 an epidemic of this disease was responsible for killing 10 percent of the hogs in the United States.

After much trial and error, research scientists of the former Bureau of Animal Industry identified a virus as the cause of hog cholera. Following this, vaccination with live hog cholera virus and serum was started. This type of immunization saved the swine industry of the country. Periodic outbreaks, however, continued to occur. Investigations revealed that they were due to no vaccination or, in some cases, were directly attributable to the virulent virus used in the immunization.



Because of the annual incidence of the disease, as well as the fact that the immunizing agent itself was capable of introducing infection on premises, no State or Federal programs were proposed for the eradication of the disease. Its control, consequently, remained with the owner and the practicing veterinarian.

In 1951, modified live virus vaccines were perfected, which considerably reduced the hazard of virus introduction from immunization. The trend since then has been reduction in the use of virulent virus and its replacement with modified live virus and serum. Also in 1951, the United States Livestock Sanitary Association outlined procedures in a recommended hog cholera eradication program.

Status and stimulus

Increased use of newer immunizing agents and the prohibition against feeding raw garbage, now imposed by all the States, have stimulated the drive for eradication.

Additional impetus has come from Livestock Conservation Incorporated, which represents various segments of the swine industry. At its annual meeting in February 1960, the organization noted that losses and damage from hog cholera justified an all-out eradication effort. It recommended an educational approach and regional meetings by the U.S. Department of Agriculture to urge States to start eradication programs.

Following that suggestion, the Division and the Federal Extension Service held meetings in Chicago, New Orleans, and New York during March and May. Industry reaction was enthusiastic. A fourth regional meeting was held in Denver, Colo., in August.

The future of hog cholera

Additional regional and State meetings will be held to acquaint the various interests with the factors and problems involved in an eradication program.

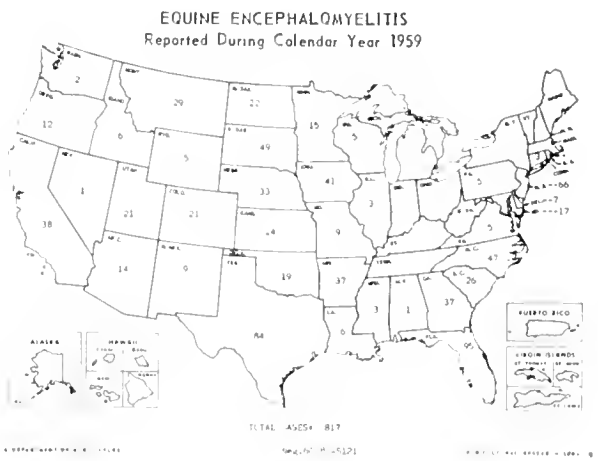
If industry then is still sufficiently interested to give its support, it is expected that State programs for the eradication of hog cholera will be started.

VIRAL ENCEPHALITIS

Like many other diseases, the encephalitides were present and inflicting widespread sporadic damage for many years before they were identified. From Boston in 1854, Texas in 1882 and 1897, North Carolina in 1902, and Louisiana in 1906 and 1907, came reports of a neurologic disease in horses. It was variously called "forage poisoning," "blind staggers," and "brain fever."

The disease was differentiated from a number of others and established, in 1930, as a definite clinical entity called equine encephalomyelitis. The identification of its viral nature came as the result of an investigation in California that year of 6,000 affected horses and mules, half of which died.

Serological distinction of the disease into two types, Eastern and Western, was made in 1933. The Eastern type has remained localized along the Atlantic Seaboard and the Gulf of Mexico, with isolated occurrences in Tennessee, Missouri, Michigan, and Wisconsin. The Western type has occurred in every State west of the Mississippi.



From 1935 through 1959, the total number of horses reported affected with eastern and western encephalitides in the United States was 503,725. Of this number, 38,258 died.

Considerable difference of opinion still exists concerning the natural history of the virus. There is general agreement, however, that neither humans nor horses are necessary to the life cycle of the disease. Both are accidental

dead-end hosts. The virus is most commonly transmitted from bird to bird, with mosquitoes the principal vector.

Sometimes horses are infected without the involvement of man. When both horse and man are involved, horse cases generally precede the human by 2 weeks. What factors are responsible for this periodic "spill-over" from birds into horses and man is not known.

With our present knowledge that the virus affects the horse, mule, ass, deer, pheasant, wild birds, and humans, it seems more appropriate to designate the disease viral encephalitis.

In horses, following incubation of several days to 3 weeks, the disease produces typical symptoms of an encephalitis, including fever of 107° F., rapid paralysis, sleepiness, eventual respiratory failure, and death. With the more virulent eastern type there may be 90 percent fatality. Horses can be protected by preseason inoculation with a bivalent vaccine, and mosquito control.

In pheasants, symptoms resemble the paralysis of botulinus intoxication. Outbreaks among pheasants in the Northeast generally accompany those in horses—suggesting involvement of the same vector. Mortality can exceed 60 percent.

Present knowledge of viral encephalitis removes the stigma from the horse as a danger to public health.

The Division has no eradication program for viral encephalitis, nor is one contemplated. Nevertheless, in these times of alertness to the threat of biological warfare, a prompt diagnosis is essential—not only for recognition of viral encephalitis, but also to be sure that it is not something else, more deadly and more difficult to control.

POULTRY DISEASES

Poultry progress

Throughout the pages of history, man has waged constant war against disease. Next to those directly affecting him and his family, the diseases that threatened his food supply have been of greatest importance. As the result of improved husbandry practices and economic pressures on the producers, the place of poultry in this food supply has increased manyfold since the days of chicken for "Sunday dinner." The housewife now has a choice between poultry or red meat products never before achieved in food logistics.

Conscious of the ever-present possibilities of economic disaster and loss of this vital segment of the Nation's food supply due to disease, the U.S. Department of Agriculture, at the industry's request, established a Poultry Disease Section July 9, 1956. Its purpose was to coordinate national poultry disease control and eradication. The section cooperates closely with State Livestock Sanitary officials, research workers, the poultry industry, and other interested governmental agencies.

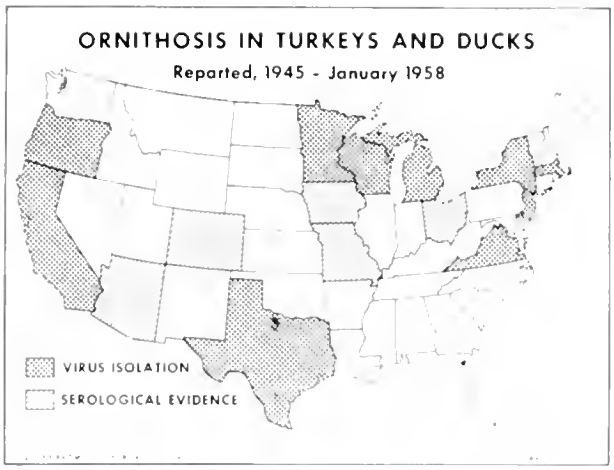
To provide its veterinarians with additional experience in poultry disease work, the Division, in 1956, started a training program at Iowa State University. Poultry disease diagnostic courses conducted in 1957, 1958, and 1959 made available for immediate field work 49 Federal, 12 State, and 2 veterinary practitioner poultry diagnosticians. Graduates have at their disposal a poultry diagnostician's kit of equipment plus detailed instructions in ADE Division Memorandum No. 501.4, Supplement 2, entitled "Investigation of Suspected Emergency Poultry Disease Outbreaks."

Ornithosis outbreaks

The immediate problem facing the new Poultry Disease Section was the alarming increase in the number of cases of ornithosis in turkey flocks in Oregon and Texas. Ornithosis in poultry and other species, or "psittacosis" as the disease is known in the parrot bird family and man, was first described in 1874 in European literature.

Evidence obtained since 1950 has indicated that ornithosis is fairly widespread among domestic turkeys. It has also been diagnosed in ducks and chickens. Numerous epidemics in humans have been traced to exposure of processing plant employees to diseased poultry or to recent importations of infected parrots or psittacine birds. Human cases of psittacosis have been most severe in Oregon and Texas; death has resulted in several instances.

A regulation to control ornithosis or psittacosis was published in the Federal Register



on March 7, 1957. This regulation (Part 82, Title 9, CFR) restricts interstate movement of poultry affected with psittacosis or ornithosis and their carcasses, parts, and offal. It also requires disinfection of coops and vehicles used in transporting affected poultry.

Management factors in condemnations

When compulsory inspection of dressed poultry moving in interstate traffic became law on January 1, 1959, there arose the problem of high condemnation rates, particularly from chronic respiratory disease. In an effort to find some solution for this economic loss, the Division in cooperation with the Agricultural Marketing Service conducted surveys in selected flocks in Arkansas, Louisiana, Mississippi, and East Texas. These limited surveys indicated that the high condemnation rates were caused by lack of good management, inadequate housing, and substandard or no disease control plans by producers. Similar cooperative studies with State and industry representatives have been conducted in Georgia and the Delmarva Peninsula.

Poultry prospects

Eradication of ornithosis or psittacosis cannot be planned at this time because of the unavailability of a reliable, practical field diagnostic test. The immediate objective is the dissemination of information regarding the nature and clinical manifestations of the disease. After treatment, recovered flocks may be marketed when deemed safe by State and Federal officials.

In 1958, the National Plans Conference of the National Poultry and Turkey Improvement Plans adopted a resolution requesting that the Animal Disease Eradication Division promulgate a Federal Regulation limiting the interstate movement of poultry except from those flocks and hatcheries that meet the minimum requirement of the NPIP and NTIP in regard to pullorum disease and fowl typhoid control. The regulation was published, and comments from industry groups are being reviewed before further action is taken.

The Division is engaged in cooperative studies on poultry diseases with State universities and State departments of agriculture in Georgia, Maine, Minnesota, and Virginia.

In future plans and operations the watchword is vigilance. Through the Poultry Disease Section, the Division is in a better position to deal with any foreign poultry disease that may gain entry into this country. Concurrently, close scrutiny will be kept on changes in the epidemiological patterns of diseases now present in the United States. This work will be accomplished by recording data reported by the individual States, conducting epidemiological surveys concerning chronic respiratory disease, and gathering information on the latest research developments.

Laboratory Services

LOOKING BACK IN LABORATORY SERVICES

In June 1955 a committee of scientists inspected Agricultural Research Service disease laboratories in Washington, D.C., and at Beltsville, Md.; Auburn, Ala.; and Denver, Colo., and reported that the laboratories were not adequate to safeguard employees from exposure to disease or the experimental work from cross-contamination. Much of the laboratory work in research and regulatory fields at Washington, Auburn, and Denver was discontinued. Also, in 1955, laboratory programs which had been performed by the Pathological Division of the former Bureau of Animal Industry, were assigned to Animal Disease Eradication in 1955. These laboratory programs were placed under the staff position of Laboratory Services, which now has been enlarged to a staff of 45.

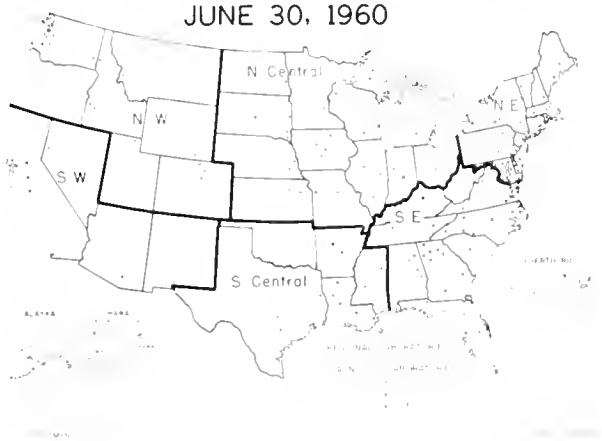
In addition to maintaining facilities in Washington, D.C., and at Beltsville, Md., and Ames, Iowa, Laboratory Services maintains a close working relationship with all diagnostic laboratories in the United States and in many foreign countries. There are 155 animal diagnostic laboratories in this country. Biological cultures, reference materials, and direct assistance are provided to these laboratories on request. A Manual and Directory of Animal Diagnostic Laboratories in the United States was completed in 1958 and distributed to field stations, State animal diagnostic laboratories, State livestock disease control officials, and others interested in State-Federal programs.

Diagnostic services for the detection of diseases that might be introduced into the United States are cooperatively administered with the Plum Island Animal Disease Laboratory. A staff member is stationed at the Plum Island Animal Disease Laboratory for this purpose and to become experienced in recognizing exotic animal diseases.

Training for Division personnel at colleges and universities is supervised by Laboratory Services. This includes approval of graduate programs as well as supervision and guidance given to individuals in such programs.

Staff members of Laboratory Services have an opportunity to become experienced in many fields related to the control and eradication of animal diseases. The functions of the staff office are practical, and often provide the great satisfaction of applying knowledge on a pilot scale for disease eradication which has been established only through many years of scientific research. The staff office provides a corps of technical personnel having a broad range of experience with a wide variety of animal diseases.

ANIMAL DISEASE DIAGNOSTIC LABORATORIES
JUNE 30, 1960



Division programs actively supported by Laboratory Services are those for the eradication of brucellosis, tuberculosis, screwworms, vesicular diseases, scabies, and scrapie. Laboratory programs are also in progress to support activities in anaplasmosis, leptospirosis, enzootic abortion of ewes, and enteric infections.

ACHIEVEMENTS

Washington, D.C.

The staff of Laboratory Services was instrumental in compiling and editing material for inclusion in a publication requested by the subcommittee on Reorganization and International Organizations of the Senate Committee on Government Operations. Entitled "Veterinary Medicine of the United States and its Contribution to Man's Health and Welfare," it deals with both national and international organizations and agencies in which veterinary medicine of the United States plays a part. It will be used mainly for congressional review but should serve as an invaluable documentary of information on the services veterinary medicine has rendered to mankind.

The semiannual check test kits for brucellosis were supplied to all of the principal State-Federal laboratories. These tests check agreement between laboratories. The results on the last series showed agreement on 92 percent of the samples tested.

The chemistry unit, although an integral part of the Division, performs services for both Animal Disease Eradication and Animal Inspection and Quarantine Division pertaining to (a) acaricides, (b) disinfectants, (c) animal tissues and other matter suspected of containing poison, (d) animal byproducts offered for entry from areas having or suspected of having foot-and-mouth disease or rinderpest, and (e) diagnostic agents.

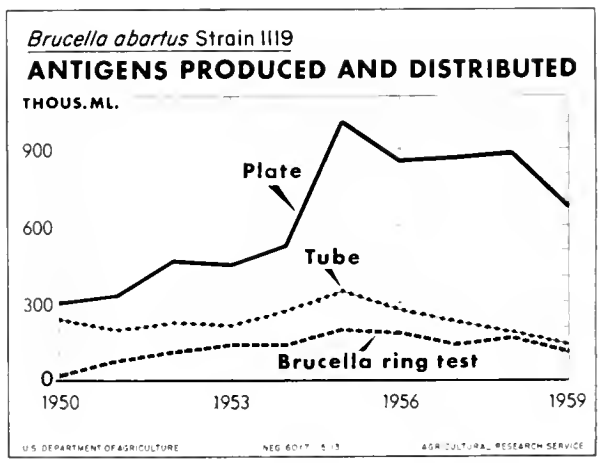
Two hundred and eighty-seven chemical analyses on products and materials were completed in 1960. In addition to chemical analyses, the laboratory develops apparatus and methods for vat-side testing of dips used in the Division's regulatory work. To maintain this testing of dipping baths, chemicals for 16,872 tests were furnished field inspectors. Also supplies for 967 tests were furnished inspectors for determining the preservatives in serums, vaccines, and diagnostics manufactured under the supervision of the Veterinary Biologics Inspection Section of Animal Inspection and Quarantine.

All pullorum antigen employed for official testing under the National Poultry and National Turkey Improvement Plans must meet the chemical and sensitivity standards established by Laboratory Services. Tests representing a production total of 1,349,488 milliliters of K polyvalent pullorum whole-blood antigen, 1,021,751 milliliters of Redigen whole-blood antigen, and 37,605 milliliters of pullorum tube antigen were performed in 1960 in support of this program for the control of salmonellosis.

Beltsville laboratory

BRUCELLOSIS.—All diagnostic materials used to conduct Brucellosis serological tests are produced at Beltsville.

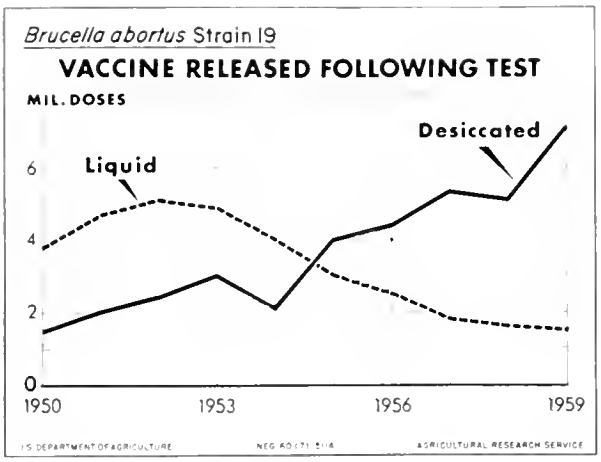
A total of 702,240 milliliters of Brucellosis plate antigen, 119,500 milliliters of concentrated tube antigen, and 114,060 milliliters of Brucella Ring Test antigen were produced during 1960. The amounts of the three antigens produced each year reflect the activities of the brucellosis eradication program since 1950.



Antigens are distributed for the most part to State-Federal Cooperative Laboratories. Small amounts are furnished on request to research institutions and foreign countries designated for use as standard antigens for comparative testing or research purposes. More than 10,000 agglutination tests for brucellosis were made on samples from cattle and swine from Federal herds during 1960.

Commercially prepared Brucella plate antigens totaling 119,600 milliliters were tested for sensitivity, total cell concentration, purity and sterility and were found to be satisfactory for diagnostic purposes.

All *Brucella abortus* strain 19 vaccine produced in the United States for use in State-Federal brucellosis eradication is examined at Beltsville before release. Vaccines that do not meet the rigid requirements for purity, hydrogen ion concentration (pH), total cell concentration, viability, and colonial characteristics are rejected. During the year, 1,516 serial lots, representing 8,604,946 doses, were tested. Of this amount, more than 7,949,876 doses (92.4 percent) were released as safe and reliable for use. There has been a gradual increase in volume production of desiccated strain 19 vaccine (lyophilized) since the release of this product in 1945. Eighty-six percent of the 43,024,733 milliliters produced in 1960 were desiccated vaccines.



In addition to the Brucella strain 19 vaccine (liquid) produced at Beltsville for reference purposes, 840 doses were distributed for vaccinating calves in 19 Federal institution herds.

On numerous occasions, cultures of the organism causing brucellosis have been supplied to private and Government laboratories in the United States and in many foreign countries.

To replace stock cultures for use in producing the vaccine, continuous since the procedure was inaugurated in 1940, 107 selected *Brucella abortus* strain 19 cultures were supplied to 17 commercial laboratories and 2 State institutions during 1960, and 106 selected cultures were sent to 17 foreign countries. Of the 213 cultures distributed, 50 percent were furnished for distribution outside the continental United States.

Thirty-six selected cultures of *Brucella abortus* antigen strain 1119-3 were distributed to 4 States and 10 foreign countries for use in producing antigens and for research purposes. Stock cultures of *Brucella abortus* strains 19 and 1119-3 (lyophilized) are maintained at the Division laboratories at Beltsville for immediate distribution to approved institutions throughout the world.

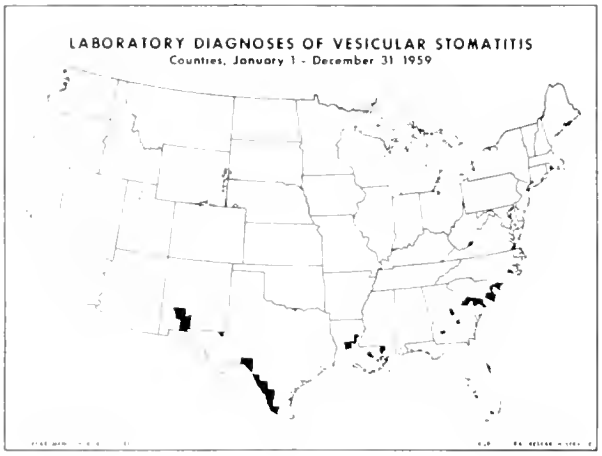
The Division also extends technical assistance and training to scientists from many foreign lands interested in the brucellosis eradication program of the United States. As a result of those exchanges, a close working relationship has been established with scientists in many parts of the world.

Through arrangements with the International Cooperation Administration and other agencies, 26 individuals representing 16 foreign countries and the Pan American Sanitary Bureau were approved for visits to the Beltsville Laboratories in 1959. The various phases of production, standardization, and control of Brucella antigens and vaccine and the diagnosis of brucellosis in animals were demonstrated and discussed.

During the year, 1,716,460 milliliters of mammalian contract tuberculins produced commercially for the Agricultural Research Service were tested and released as satisfactory for use in the State-Federal program for diagnosis of tuberculosis.

VESICULAR DISEASES.—Serological testing is another important function of Laboratory Services at Beltsville. Of special importance is the diagnosis of vesicular exanthema, infectious bovine rhinotracheitis, and vesicular stomatitis, and their differentiation from foot-and-mouth disease.

Vesicular stomatitis of the New Jersey type was the only vesicular disease diagnosed in 1959 from 36 tissue and 257 serum samples received. The first cases again were reported during May from the enzootic coastal plain areas of North Carolina, South Carolina, Georgia and Louisiana. Simultaneously, vesicular stomatitis appeared in six counties bordering the Texas side of the Rio Grande River. The Texas outbreak was part of an epidemic that progressed northward through Mexico, crossed the Rio Grande into Texas, and finally abated.



The epidemiology of this Texas outbreak is comparable to that of 1949, which also started early in the season and progressed from Texas and Arizona into Colorado, Utah, Wyoming, and Wisconsin before it stopped in the fall. The possible reservoirs of infection and vectors remain unknown. The infection frequently spreads from the Carolina-Georgia and Louisiana-Mississippi endemic coastal plain areas northward into Virginia, West Virginia, and Maryland.

ANAPLASMOSIS. — Serological diagnosis of anaplasmosis of cattle is another activity of the Beltsville laboratory. Interest in the possibility of establishing a control program for this disease is increasing. Since the Agricultural Research Service is no longer in a position to produce anaplasmosis antigen in its own laboratories, a cooperative agreement has been established for its production at the Texas Agricultural Experiment Station.

Two million test doses of anaplasmosis complement-fixation antigen were delivered to the Division's Beltsville laboratory on June 7, 1960, by the Texas A & M College. This delivery completed phase I of the cooperative project between the Division and Texas A & M College for the production of anaplasmosis antigen. The antigen is now available for distribution to cooperating laboratories. Under phase II, another 2 million test doses are scheduled for delivery by June 30, 1961.

The Beltsville laboratory is responsible for distributing antigen, complement, standard sera, and other diagnostic materials related to performance of the complement-fixation test for anaplasmosis in the various field laboratories.

It also maintains general supervision of testing efficiency and accuracy of the 16 Federal, State, or University laboratories engaged in the testing of serum for anaplasmosis. A composite report of the results on a large number of unknown serum samples forwarded to these 16 laboratories for comparative test has recently been made. A total of 21 State or Federal serologists have completed training at the laboratory in the complement-fixation test for anaplasmosis.

The new "small" tube technique for anaplasmosis has been inaugurated and all laboratories engaged in anaplasmosis testing have been so informed. Each laboratory was furnished the new publication, "Manual and Directory of Animal Diagnostic Laboratories in United States," standard serums, hemolysin, standard complement, and antigen.

The serology unit also tests for dourine and glanders all equine serum samples submitted from the various quarantine stations and other points.

During 1960, 11,085 tests were made for dourine and 11,075 for glanders.

Ames diagnostic laboratory

The Diagnostic Laboratory at Ames, Iowa, was established in 1957 under a cooperative agreement with Iowa State University to service the Division's programs in tuberculosis, brucellosis, scrapie, and other diseases of national interest. The staff of 20 will be transferred to the National Animal Disease Laboratory in 1961.

TUBERCULOSIS.—Many new types of bacterial organisms closely resembling *Mycobacterium tuberculosis* are being recovered from human patients thought to be tubercular. In order to maintain the confidence built up in the tuberculin test over the years, it was important to get more information about the causes of reactions to mammalian tuberculin in no-gross-lesion cases under field conditions. A project was established for this purpose in 1957.

Specimens collected from animals that reveal NGL reactions as well as specimens from regular kill are studied. Procedures include direct culturing of specimens, animal inoculations for initial recovery of organisms and

typing, and staining of smears and histological sections for evidence of acid-fast organisms.

Isolations of soil acid-fast organisms are capable of producing allergens which cross-react with mammalian and avian strains. These allergens usually produce low sensitivity when injected intramuscularly. Guinea pigs inoculated intramuscularly with soil acid-fast isolates were still reacting 3½ to 4 months after inoculation; only avian and mammalian tuberculin were used on the second test. The greatest reaction was obtained with avian tuberculin. Field evidence indicated the soil acid-fast produced sensitivity may be of short duration, and the time between exposure and testing will be shortened to less than 2 months in future laboratory trials.

Microscopic study of 417 cases of suspected tuberculosis lesions on regular cattle kill was made. Thirty-one percent were positive for acid-fast bacteria, and another 10 percent contained atypical acid-fast organism. Of the remainder, 33 percent were mycotic, parasitic, or neoplastic, and 26 percent were negative. This compares favorably with lesions selected from tuberculosis-reactor animals. Out of 160 such lesion cases, 23 percent showed typical organisms and 17 percent showed atypical acid-fast bacilli. Of other causes, 22 percent were mycotic, parasitic, or neoplastic, and 38 percent were completely negative. While indicating the general effectiveness of the tuberculosis control program, these figures reflect the difficulties that will be encountered in the final phase of tuberculosis control. They stress the importance of careful meat inspection and laboratory procedures in detecting tuberculous animals on regular kill, and tracing them back to source herds, which may then be tuberculin-tested.

Studies were completed on the use of media versus laboratory animals for primary isolation of acid-fast organisms from bovine tissues. These studies revealed that certain media are as good as laboratory animals, or possibly better, for the primary isolation of *Mycobacterium tuberculosis* organisms. This has resulted in a saving of time and laboratory animals.

BRUCELLOSIS.—Correlation of serological and bacteriological results in reactor herds is in progress. Attempted isolations from 63 vaccinates in 10 herds were positive in 18 (29 percent) of the animals, although 1 of the infected vaccinates were in the negative or suspect serological range. In nonvaccinated cattle, isolations were possible in 19 (46 percent) of 41 animals in 8 herds, and only 2 of these were classed as suspects. In herds containing both vaccinated and nonvaccinated animals, 45 percent of the isolations were from vaccinated cattle, while 55 percent were from nonvaccinates. Only 1 of the 15 herds that were shown to contain infected cattle had a negative Brucella Ring Test (BRT) history.

An isolation of a Brucellalike organism was made from tissues submitted by the New Mexico field station from a ram with a history of loss of viability of sperm. Preliminary serological and biochemical studies revealed that the organism has certain characteristics of all three of the Brucella species but is dissimilar to any one in particular.

TRICHINOSIS.—The cooking of garbage fed to swine was initiated as a measure to control vesicular exanthema; however, other diseases are also reduced by this measure. One of these is trichinosis. To evaluate the incidence of Trichina, 64 lots of 1,896 diaphragms were examined for the isolation of *Trichinella spiralis*. Trichina were found in 188 diaphragms of 21 of these lots. Since diaphragms were submitted only from Northeastern States, the study did not show national distribution.

SCRAPIE.—Pathological evidence is used to diagnose scrapie, as no virological means are available. Diagnosis is based on the history and findings of characteristic vacuoles in the brain. Twenty-seven laboratory confirmations of the disease were made at the Ames Laboratory from January 1958, to August 4, 1960.

Studies have been started to evaluate the present methods of histopathological diagnosis.

DIAGNOSTICIANS AND EPIDEMIOLOGISTS

Specialized training programs are being utilized to establish teams of diagnosticians and epidemiologists for investigating and studying animal disease outbreaks. These groups will function for field investigational work when diseases of unusual nature or pro-

portions are encountered. This service will include diagnosticians and epidemiologists for vector-transmitted diseases, industrial and phytotoxicological diseases, radiation diseases, mycotic, protozoal, and viral diseases. Other teams will be trained in the investigation of such exotic diseases as rinderpest, foot-and-mouth disease, and virulent strains of Newcastle disease of poultry.

Records of past anthrax outbreaks suggest that alternate wet weather and drouth, where the organism is established in the soil, may cause increased incidence of the disease. The prediction of a 1959 increase in the Southern Great Plains was followed by the identification of at least four foci of infection. The importation of infected cattle from Mexico caused a fifth outbreak.

Studies of hog cholera and immunization procedures in the Corn Belt indicated that weather may also favor complications following vaccination with modified viruses. Sequelae were reported more common during hot, humid weather. The need to continue use of virulent virus was not established.

COOPERATIVE PROJECTS WITH OTHER LABORATORIES

Salmonellosis

Because of the importance of serological typing in a program to control salmonellosis in domestic farm animals and poultry, a cooperative program was established with U.S. Public Health Service.

A bacteriologist has been assigned by the Division to the Communicable Disease Center in Georgia to conduct typing and identification of enteric organisms of animal origin. This has enabled State animal disease diagnostic laboratories to submit more cultures for study and typing. This laboratory activity will be transferred to the National Animal Disease Laboratory in 1961.

Leptospirosis

The relationship between leptospirosis in wildlife and livestock is under study by an epidemiological team in cooperation with the New Bolton Center of the University of Pennsylvania.

It is important to establish the role of wildlife leptospirosis in the study area because of many favorable opportunities for the transmission of infection to domestic animals and to humans. This team is using the agglutination-lysis test and several nutrient media to isolate and identify leptospira from livestock, the water supply, and from wildlife in the vicinity of the diseased herds.

The motility of leptospira and their lack of resistance to drying makes water a principal means of spread. Investigators have found leptospira are adversely affected by acidic water; they lose motility at a pH below 6.0. They prefer alkaline water. Stream pH in the area of study varies from 6.9 to 8.5. Many streams and pools persist throughout the year, and during their low stages in summer, animals standing in them may become infected.

Although the project has been active for less than 6 months, much information regarding the role of wildlife has accumulated. The demonstration of *Leptospira pomona* infection in a woodchuck indicates the importance this common inhabitant of pastures might assume in control of bovine leptospirosis. One outbreak was investigated in which blood cultural isolations were made from 8 of the 22 cattle in the herd. The source of infection was found to be carrier animals which were introduced into the herd less than a month before the blood isolations were made.

A national survey of serological techniques used in the diagnosis of leptospirosis was completed this year. Check samples were submitted to all laboratories conducting leptospirosis tests.

The results indicated considerable variation in procedures. Adoption of a standard test with strict adherence to details of procedure would improve the uniformity of results. Efforts are being made to encourage the adoption of a standard serological technique. The various tests, such as the agglutination-lysis test, are being studied to determine the sources of their inherent variation. A serological method for detecting dairy herds infected with leptospirosis by means of the composite herd milk sample has been developed. Serum samples of ani-

mals, including wildlife, submitted from all parts of the United States are examined for antibodies against at least 12 leptospiral serotypes. This service is of particular value where signs of leptospirosis are observed, but routine testing with *Leptospira pomona* antigen yields negative results. Where infection with the less common serotypes is indicated locally (Iowa), field investigations are performed in an effort to isolate the causative agent.

Enzootic abortion

RECORD OF THE DECADE.—The virus of enzootic abortion in ewes was first discovered in Scotland in 1950. Since then it has also been reported in several European countries.

In the spring of 1958, the Montana Veterinary Research Laboratory isolated and identified the virus in ewes in Montana. This was the first report of the disease in this country. It confirmed the belief that many of the hitherto undiagnosed cases of abortion in sheep in the United States may have been due to this virus. Its similarity to the enzootic abortion virus of Scotland was subsequently established by a Scottish research group. Although exact distribution and prevalence of the disease in the United States were unknown, it was suspected to be widespread.

A STUDY OF INCIDENCE.—The Division entered into an agreement with Montana State College on January 26, 1959 to study the prevalence of enzootic abortion in ewes in this country and to improve the antigen used in the complement-fixation test for the disease.

The survey was initiated by soliciting samples from flocks in which ewes had aborted and had a negative history as regards vibrio infection. During the period January 26, 1959 to April 21, 1960, the following results were reported by Montana Veterinary Research Laboratory, Montana State College:

Incidence of enzootic abortion reported during the period January 26, 1959–May 16, 1960

State	Flocks			Sheep		
	Total	Positive	Suspicious	Total	Positive	Suspicious
Arizona	1	0	0	38	0	0
California	6	1	0	61	1	2
Colorado	1	0	0	6	0	0
Idaho	22	18	1	1,116	152	83
Montana	18	7	1	587	78	21
Nebraska	2	0	0	26	0	0
North Dakota	4	0	2	42	0	3
Oregon	2	1	0	11	1	1
South Dakota	1	0	0	35	0	0
Tennessee	2	1	0	19	1	0
Utah	5	1	0	293	22	30
West Virginia	1	0	0	1	0	0
Wisconsin	1	0	0	15	0	0
Wyoming	9	3	1	86	16	15
Minnesota	1	0	0	1	0	0
New Mexico	1	0	0	15	0	0
New York	1	0	0	7	0	0
Iowa	1	0	0	9	0	0
Totals[1]	79	35	5	2,671	271	158
Percent		44.3	6.0		10.7	5.8

[1] Positive flocks were found in 7 of 18 States submitting samples. Suspicious flocks were found in 1 additional State.

Survey work conducted thus far indicates that EAE has been in this country for some time. This work has been biased to some extent by the sampling of suspected flocks. A more accurate indication of the prevalence of this disease could be had by testing random samples collected from ewes at time of slaughter.

Vaccination studies have not yet been completed.

FUTURE AIMS.—A psittacosis-lymphogranuloma group antigen is produced from enzootic abortion virus. The current complement-fixation test is not specific and not too effective in individual animals. It is fairly accurate when used to diagnose the condition in flocks provided 30 percent of the flock is tested.

Additional survey work is needed to more accurately determine the prevalence of enzootic abortion in ewes. Further studies also are necessary to refine the antigen and increase its specificity.

The disease is not the type, such as foot-and-mouth disease, rinderpest, or African Swine Fever, that compels drastic action.

Considering the economic effect of the disease in other countries, and the additional studies that are necessary, present circumstances do not warrant Division participation in a control program.

THE WORLD PICTURE.—This is not a reportable disease in countries such as England, Scotland, and France. Regulatory officials do not believe that its economic effects in sheep in those countries warrant an eradication program.

A voluntary vaccination program is followed. The vaccine is reported to be effective. Even in infected flocks, the rate of abortion appears to decrease rapidly following vaccination of all ewes.

LOOKING AHEAD IN LABORATORY SERVICES

Laboratory Services must look toward providing even broader diagnostic programs to meet the varied and changing needs of the Division. Specialists in the epidemiological study of most major diseases of animals must be available to meet the challenge of this highly technical field. Expanded and modern facilities and equipment will soon be available at the National Animal Disease Laboratory.

Funds totaling $16,250,000 were granted in July 1956 for establishment of the laboratory. Construction began in late summer of 1958 on a 318-acre farm tract east of Ames, Iowa. The national laboratory will include an Administration Building, large and small animal laboratory buildings, a central heating and emergency power plant, sewage decontamination plant, and various types of support structures and animal quarantine barns.

Most of the activities of Laboratory Services will be transferred to the new laboratory in the spring or summer of 1961. Regulatory functions will occupy approximately 20 percent of the total space, of which about one-half will be devoted to diagnostic services for Division programs. The remaining space will be used for laboratory functions in support of the biologics control programs of the Animal Inspection and Quarantine Division.

The diagnostic services programs at the National Animal Disease Laboratory will require a staff of about 50, of which 18 will be veterinary specialists. The remainder will be technical employees, animal caretakers, and others required to service the various programs. Recruitment for the laboratory staff at Ames has been limited almost exclusively to present Division personnel having an interest in the laboratory service programs of the Division.

The staff will move into these new facilities with a continuing determination to provide the best possible diagnostic services to meet the program needs of the Division.

Interstate Movement of Livestock

INTERSTATE REGULATIONS

Many regulations are considered by the public as a burden imposed on commerce for purposes they do not readily comprehend.

However, regulations fill an important gap in animal disease control and eradication programs. Methods of disease dissemination are thoroughly studied, and regulations are drawn to prevent spread of the diseases. If these regulations were not enforced, most programs would be ineffective.

Interstate Regulations administers two programs:

(1) Enforcement of regulations promulgated under authority of the Animal Quarantine Laws. (Acts of May 29, 1884; February 2, 1903; and March 3, 1905)

(2) Enforcement of the 28-Hour Law. (Act of June 29, 1906)

Animal quarantine laws

The regulations promulgated pursuant to the Animal Quarantine Laws are contained in Parts 71 through 83 of Title 9, Code of Federal Regulations. These regulations are designed to prevent the spread of communicable diseases by controlling the interstate movement of livestock, including poultry, which are apparently free of disease or exposure thereto. Special provisions permit the interstate movement of reactors to the tuberculosis, brucellosis, and paratuberculosis tests, but only under certain carefully supervised conditions which insure their proper handling until final disposition.

The regulations also provide for the proper cleaning and disinfection of all cars, boats, and other vehicles used in the interstate transportation of diseased livestock and poultry. These sanitary precautions apply likewise to yards and other premises used in connection with such shipments.

Inspection for compliance with the laws is conducted throughout the United States at highway and railroad points, stockyards, and livestock centers. Apparent violations are reported to the Department for further investigation and possible prosecution.

During 1960, reports were received of 367 violations of the AQ Laws. Twenty-eight of these cases, together with 8 on hand at the beginning of the year, were closed when further investigation revealed that either a violation did not occur or there were insufficient grounds on which to prosecute. Of the 225 cases sent to the Office of the General Counsel, 180 were recommended for prosecution. Because of extenuating circumstances it was recommended that the remaining 45 cases be disposed of by letters of warning.

In the same period, notice was received of 199 dispositions as follows:

99—by Court action (including 2 dismissals).

29—declined for prosecution by the Department of Justice; however, 27 of these cases with the concurrence of the Department of Justice had been recommended for disposition by letter of warning.

71—declined for prosecution by various United States Attorneys; however, warning notices were issued to the alleged violators.

28-hour law

With the advent of railroads there began a new epoch in the delivery of livestock to markets. "The first cars employed were crude affairs, built of slats without overhead protection and without means provided for watering. . . . car roofs were built, not for shelter, as might be supposed, but to prevent the cattle from jumping out, as the railroads had incurred considerable losses from that cause."

This mode of transportation was attended with much cruelty. As reported from several sources in 1871: "Cars are terribly overcrowded, and animals are carried great distances without food or water." . . . "Cattle trains yield the road to most others, and pass hours on sidings; the animals are without food or water, and often with insufficient ventilation in summer or shelter in winter; they are jolted off their legs and then goaded till they struggle up, for they cannot be permitted to lie down; they thus arrive at destination trampled upon, torn by each others' horns, bruised, bleeding; having in fact suffered all that animals can suffer and live. The whole system of cattle transportation in the United States as at present conducted is an outrage on the first principles of humanity."

A monotonously deadening repetition of these practices and a mounting public clamor culminated in the Act of June 29, 1906. This is essentially a law to prevent cruelty to animals while in transit interstate. It prohibits the confinement of animals in a car for a period longer than 28 consecutive hours without unloading them in a humane manner into properly equipped pens for rest, water, and feeding for a period of at least 5 hours. In some instances animals may be fed and watered without unloading them into pens, provided adequate space is available for rest in the cars. And in some cases written request, accidental causes, or acts of nature, which cannot be anticipated or avoided by the exercise of due diligence and foresight, may excuse continuous confinement for 36 hours or longer. Although the law is applicable only to railroad and water shipments, attempts have been made to apply its humane principles to motortruck shipments as well.

The 28-Hour Law does not provide for the issuance of regulations; thus, its administration is governed by the language of the law itself and Court decisions subsequently rendered.

Enforcement of the overconfinement provisions of the 28-Hour Law is performed by examination of records maintained by the carriers (waybills and similar documents). Periodic inspections are made at the more than 800 feed, water, and rest stations throughout the United States to insure that the facilities

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Hogs being reloaded after a period for feed, water, and rest, in compliance with the 28-hour law.

and equipment are adequate and properly maintained. Railroads operating such facilities are promptly notified to correct unsatisfactory conditions. Apparent violations of the 28-Hour Law are reported to the Department for further investigation and possible prosecution.

In 1960, 482 reports were received of alleged violations of the 28-Hour Law. Prosecution was recommended in 252 cases. During this period reports were received on 176 prosecutions in which penalties of $18,450 and costs were imposed.

Interstate Regulations was also instrumental in developing and distributing the following publications:

(1) ARS 91-13, "A Guide for the Enforcement of Regulations Governing the Interstate Movement of Livestock and Poultry." This comprehensive manual was issued as a source of information to field representatives and as a guide to uniform procedures to be used in investigating and reporting apparent violations of the 28-Hour Law and the Animal Quarantine Laws.

(2) "Regulations and Laws Administered by the Animal Disease Eradication Division." This publication contains a reprint of subchapters B and C of chapter 1, title 9, Code of Federal Regulations, and also certain Acts of Congress that are the basic laws upon which the rules and regulations of the Animal Disease Eradication Division are based.

(3) ARS 91-17, "Health Requirements and Regulations Governing the Interstate and In-

ternational Movement of Livestock and Poultry." This is a loose-leaf compilation of all the State and Federal regulations and also includes the Animal Inspection and Quarantine regulations and the Canadian import regulations.

Objectives

A well-informed field organization is essential for the proper enforcement of our programs. As before, meetings will be held as conditions warrant for the purpose of improving operating procedures. Changes in regulations and other information having widespread application will likewise be promptly brought to the attention of our inspectors.

Contact will be maintained by field representatives with individuals and organizations engaged in livestock activities to keep them informed of the laws and regulations pertaining to their activities. Such contacts should do much to prevent or reduce the number of inadvertent violations.

A more effective enforcement of the interstate regulations and laws has resulted from close cooperation with State and local livestock officials. It is expected that this cooperation will continue with increasing advantages to all agencies engaged in animal disease control programs.

PUBLIC STOCKYARDS

The first record

An Act of Congress dated May 29, 1884, authorized the Commissioner of Agriculture to organize a Bureau of Animal Industry, appoint a Chief "who shall be a competent veterinary surgeon," and to employ a force "not to exceed 20 persons at any one time."

The same Act, Section 4, authorized special investigations of pleuropneumonia, or any contagious, infectious, or communicable disease, "along the lines of transportation from all parts of the United States. . . ."

In this general language lies legal authority for public stockyards inspection.

For several years Texas fever was the only disease subject to stockyards control. In 1897, inspection was extended to sheep scabies and in 1903, to cattle scabies. By 1905, activities were enlarged to embrace inspection for communicable diseases of all livestock received at public stockyards.

Since its beginning, public stockyards inspection has been important in controlling or eradicating Texas fever in cattle, dourine and glanders in horses, scabies in sheep and cattle, foot-and-mouth disease, and vesicular exanthema.

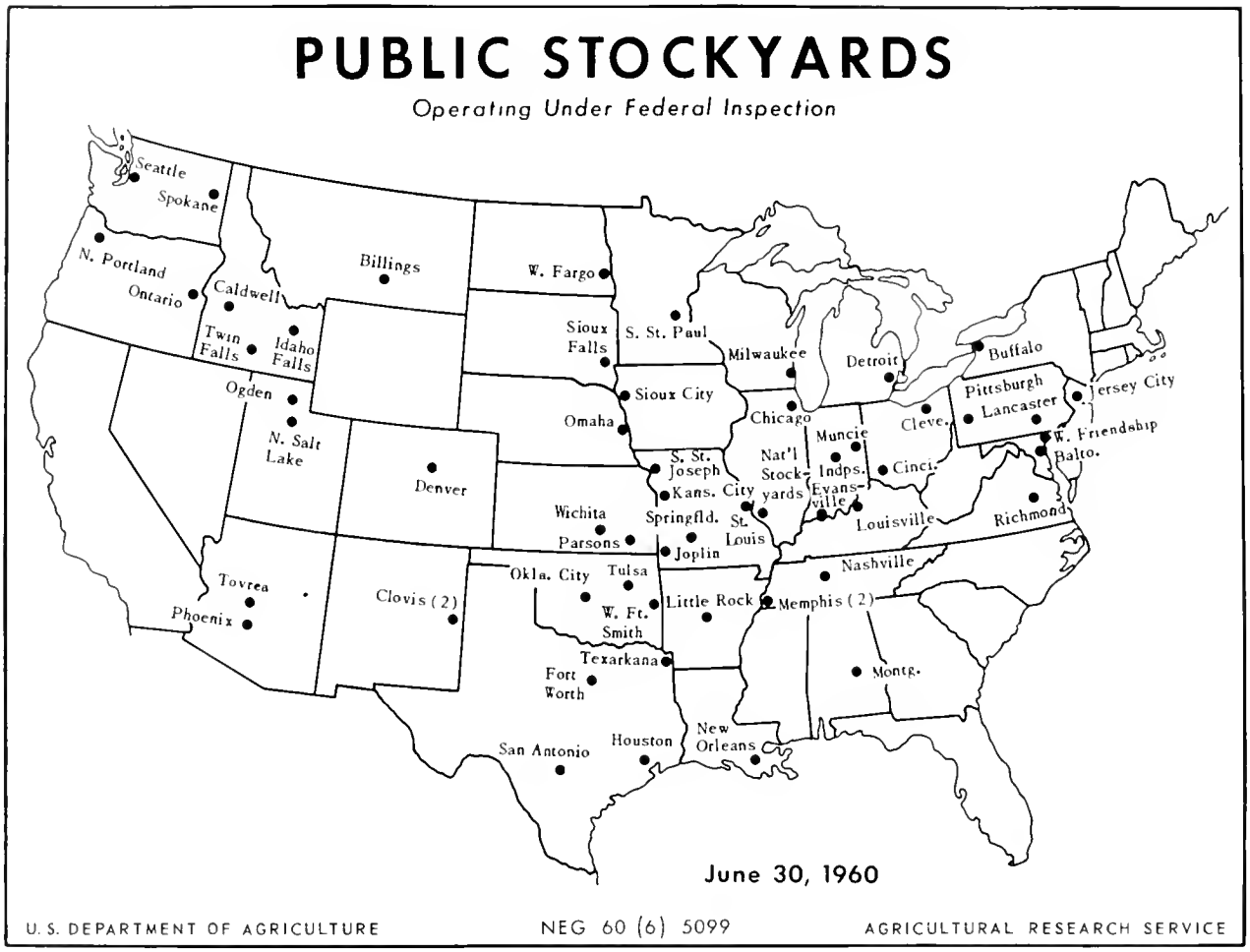
The stockyards service proved its importance in controlling and eradicating vesicular exanthema. Since most major markets were involved, the manner in which VE was handled unquestionably prevented the development of additional foci of infection. On many occasions stockyards inspection not only stopped the spread of infection but also helped the Division locate farm sources where the disease was not known to exist.

The cooperation between the management of stockyards companies and the Division in controlling the VE epidemic cannot be overemphasized. It demonstrated that in these days of rapid transit, the Division, by working with marketing interests, can effectively control the spread of livestock diseases.

Stockyards inspection activities were enhanced when, in furtherance of efforts to prevent the spread of brucellosis, provision was made, on January 1, 1957, for specifically approved stockyards and slaughtering establishments. These approved establishments operate under State inspection. Cattle may move interstate to them without having to meet certain prior requirements. Subsequent movements from such markets, however, must be in compliance with Federal regulations. As of June 30, 1960, there were 3,430 such establishments.

The importance of stockyards inspection

From an economic standpoint, no service supplies more information on the health of the Nation's livestock than does the stockyards inspection service. If efforts were being made to learn which diseases existed in livestock, inspection of premises would be required. This would be an impracticable service. However, a very satisfactory method of making this determination is available by inspecting the 60 to 65 million animals that annually move through 56 major marketing centers.


PUBLIC STOCKYARDS
Operating Under Federal Inspection
Seattle
Spokane
N. Portland
Ontario
Caldwell
Twin Falls
Idaho Falls
Billings
W. Fargo
Sioux Falls
S. St. Paul
Milwaukee
Detroit
Buffalo
Ogden
N. Salt Lake
Omaha
Sioux City
Chicago
Cleve.
Pittsburgh
Lancaster
Jersey City
W. Friendship
Balto.
Denver
S. St. Joseph
Kans. City
Nat'l Stock-yards
Muncie
Indps.
Cinci.
Evans-ville
Louisville
Richmond
Wichita
Springfld.
St. Louis
Parsons
Joplin
Tovrea
Phoenix
Clovis (2)
Okla. City
Tulsa
W. Ft. Smith
Little Rock
Memphis (2)
Nashville
Texarkana
Fort Worth
Montg.
San Antonio
Houston
New Orleans
June 30, 1960
U. S. DEPARTMENT OF AGRICULTURE
NEG 60 (6) 5099
AGRICULTURAL RESEARCH SERVICE

This service provides a means of preventing the interstate spread of communicable diseases of animals. It also builds confidence in buyers at inspected markets that they are getting healthy livestock.

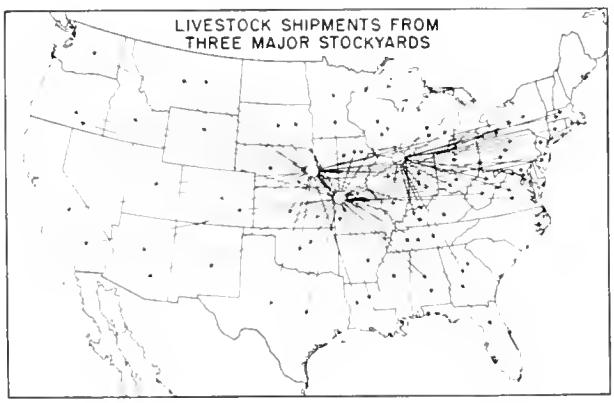
The statistical story

In 1960, a total of 219 Federal veterinarians and livestock inspectors examined, segregated, and safely handled all diseased animals. Under their supervision, 2,536 cars and 24,882 trucks contaminated by diseased animals were cleaned and disinfected.

Inspectors directed the dipping for scabies of 53,627 cattle and 374,834 sheep, and supervised the immunization of 150,043 hogs against cholera.

For the interstate movement of livestock found to be apparently free from communicable diseases, inspectors issued 296,045 health certificates.

The following statistics show the comparative volume of activities at public stockyards in 1959 and 1960:



	1959 Number	1960 Number
Stockyards operating	58	58
Cities in which located	56	56
Animals inspected:		
Cattle	21,977,606	21,700,786
Sheep	11,908,863	12,351,029
Swine	28,926,309	31,448,004
Total animals inspected	62,812,778	65,499,819
Animals dipped for scabies:		
Cattle	21,456	53,627
Sheep	388,450	374,834
Swine immunized against hog cholera for movement to farms for stocker and feeder purposes	151,613	150,043
Total animals dipped and immunized	561,519	578,504
Health certificates issued for shipments	275,834	296,045
Infectious cars received	393	235
Cars cleaned and disinfected [1]	2,317	2,536
Trucks cleaned and disinfected	34,683	24,882
Diseased animals received	[2] 434,971	[3] 446,493

[1] Includes requests by States and railroads.

[2] Includes 91,620 brucellosis, 10,089 tuberculosis and 186 paratuberculosis reactors; and 333,076 other diseased animals.

[3] Includes 65,822 brucellosis, 7,077 tuberculosis and 122 paratuberculosis reactors; and 373,472 other diseased animals.

Disease Reporting

A look at the future

Experience gained in the VE epidemic emphasized the need of keeping personnel alert to the constant threat of disease whose appearance in public stockyards could wreck the livestock industry. Equally essential is competence in the early diagnosis of diseases.

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Inspectors examine livestock for symptoms of disease.

Training programs will be improved to give inspectors increasing information about disease conditions. Interchange of personnel will be made between stockyards inspection and cooperative disease eradication programs to increase familiarity with all Division activities. A manual is being written that will bring greater uniformity in the handling of livestock at public yards.

Stockyards inspectors stand in the first line of defense in protecting the livestock industry from the ravages of communicable diseases. Continuing efforts to improve inspection proficiency in the early detection of disease will further assure the public that its food supply is well guarded.

Development of reporting

When Norsemen landed on North American shores around the year 1004, they brought with them cattle, sheep, horses, and goats. By the time Jamestown was settled, these domestic animals had vanished. The Spaniards brought horses, but they remained in the west.

So when a bull and three heifers from England arrived at Plymouth colony in 1624, they came to an environment that was more nearly disease-free than it has ever been since.

Communities developed, but remained isolated. Movement of animals was local. The few early records available indicate that apparently serious losses did occur in certain localities. Generally, however, when diseases were introduced they did not become widespread.

Early agricultural journals, starting with the "American Farmer" in 1819, attempted to publish reports of animal diseases. Soon many of them had regular veterinary columns. Until the publication of the "American Veterinary Review" in 1877, these journals were the principle sources of information on incidence of animal diseases.

When the U.S. Department of Agriculture's Bureau of Animal Industry came into being in 1884, more attention was given to preparing official statistical reports showing the incidence of certain livestock diseases and the extent of loss suffered. A substantial part of this information came from routine program reports by State and Federal inspectors.

More than 35 years ago, the Secretary of the United States Livestock Sanitary Association urged that national veterinary vital statistics be collected and distributed. This recommendation was based on the conclusion that such information was essential to disease control. The Association, recognizing the need for a national reporting service, adopted a resolution recom-

mending that livestock sanitary authorities in the States gather reliable information about the health of livestock and outbreaks of communicable diseases, and forward it to a central location for summary and publication.

More recently, the Association's Committee on Morbidity and Mortality again reviewed the situation, and adopted a plan to assist the U.S. Department of Agriculture in establishing, in cooperation with State livestock sanitary officials, a system for collecting and disseminating statistics on livestock diseases. This was the beginning of the Animal Diseases Reporting System, established in the Agricultural Research Service of the U.S. Department of Agriculture, in November 1955.

Reporting will not, in itself, prevent the spread of disease. But it is an important foundation in building sound programs of livestock disease prevention, control, and eradication. During the past several years, much progress has been made. The individual States have assumed responsibility for collecting information within the State. The U.S. Public Health Service has participated actively in instituting State reporting systems. At the same time, the Agricultural Research Service has cooperated closely with State Livestock Sanitary Officials, the U.S. Livestock Sanitary Association, the U.S. Public Health Service, State health departments, veterinary colleges, the American Veterinary Medical Association, Poultry Division of the Agricultural Marketing Service, and other Federal and State agencies.

Why disease reporting?

Why is animal disease reporting important? Its purpose is to furnish continuing information that will enable us more accurately to estimate disease losses. These reports also alert us to changes in disease incidence and help in program planning.

Reporting includes four basic steps: collection of information, processing, use, and coordination. To be effective this must be a continuous cycle with each step coordinated with and supporting the others.

Shortcomings

Animal disease reporting has its weak spots. Reports rarely show all occurrences of a given disease. Sometimes practitioners fail to cooperate. Some reports do not include all of the diseases observed; others include some diseases more consistently than they do others, or may have incorrect field diagnoses.

These reports have additional weaknesses. The owner of diseased livestock may fail to consult a veterinarian, thus, the occurrence is not reported, or the veterinarian may visit the herd only once. Perhaps several cases have occurred before he is called. Others that are not reported to him may occur after his call. No reporting system can reflect all occurrences of every disease, particularly those that are common or widespread.

Obviously, these and other factors must be considered if disease reports are to be interpreted properly. Constant effort is needed to improve the system to keep the effects of these shortcomings to a minimum.

The veterinary practitioner

Since he does daily battle with disease, the practitioner has a definite stake in a reporting system, and without his help there can be no program. By his cooperation the practitioner provides a wealth of disease information not readily available elsewhere.

Although reporting programs are criticized for their inaccuracy of diagnosis and of evaluation based on incomplete participation, the means are available to obtain better data. Accuracy can be improved as time goes on. And the reports do provide the most realistic information obtainable on county, State, and national levels. This is particularly true if the information is available over a period of years so that broad trends can be recognized.

There are also indirect benfits from practitioner participation. A working relationship is created which encourages consultation and prompt reporting to regulatory officials of potentially serious disease outbreaks.

Collection of information

This is the most difficult aspect of the reporting cycle. Obviously, the widest possible range of accurate informational sources is needed if the final reports are to have meaning. Practicing veterinarians . . . . veterinary colleges . . . . veterinary science departments of

agricultural colleges and universities . . . . diagnostic laboratories . . . . inspection services at public stockyards and auction markets . . . . antemortem and postmortem inspections at slaughtering plants operating under Federal, State, and municipal supervision . . . . inspection at poultry slaughtering plants . . . . reports from regulatory officials of the Public Health Service, and State and Federal Departments of Agriculture . . . . and from Federal and State Wildlife Conservation Services . . . . all of these are current sources of useful information.

Several survey methods can be used to augment data supplied by routine reporting. One method is to conduct a survey on a herd-by-herd basis or, in a serological survey, at selected laboratories, to determine the prevalence of selected diseases in the field.

This method is valuable not only as an aid in determining the prevalence of certain diseases but also as a "monitor" for diseases not known to be in the area—particularly foreign diseases. Samples can be obtained by veterinarians taking part in a field survey or they can be chosen at random or by design from those received at laboratories in the course of routine work. Samples can also be collected from animals at slaughterhouses or concentration points, and in the case of wildlife during organized hunts, trapping programs, or as "kill-specimens" obtained at check stations during hunting seasons.

Another method is to make a comprehensive survey of representative herds to obtain information on a variety of infectious diseases and other disorders. The survey might include repeat visits and the reports could include valuable data on disease prevalence in a herd over an extended period of time.

Still another approach is to organize practicing veterinarians on a selected area basis so that on specified days or during particular periods they make detailed reports of all diseases encountered.

Also, cooperative owners might be asked to keep accurate records of disease losses in their herds over a period of time.

Processing

To simplify processing the reports, they should be prepared on standardized forms, consolidated, summarized, and distributed at appropriate intervals. As soon as the quality and quantity of data are adequate, the information can be placed on machine records to obtain more complete analyses.

Processing should be handled and planned so that eventually reports can be consolidated into a single source reference to form a picture of the incidence and prevalence of a livestock disease.

From time to time it becomes necessary to reduce summary reports to simple figures. The source data are necessarily varied and influenced by a great many factors. And while it may not be difficult to assess statistically the effects of some factors, others are more elusive. And these elusive variables must be considered in analyzing available data.

Benefits from disease reporting

To be of most value, reports should be on a monthly, semiannual, annual, and special basis. They are of particular interest to animal disease regulatory and public health officials, manufacturers of biologicals, medical schools — both veterinary and human — and many other specialized groups.

Through their use, officials and professional medical analysts are able to chart disease trends on an area, State, regional, and national scale. The recurrence of disease cycles, of great importance in disease-control activities, can be recognized through a compilation of morbidity data. With this information appropriate measures can be taken sooner to reduce losses. This is made possible through knowledge of the course the disease has taken in a certain area, or is likely to assume at a particular time, or under any given circumstances.

A reporting system is of inestimable use in the sound evaluation of research requirements and is invaluable if control and eradication programs are to be given adequate advanced planning.

Routine clinical reports regularly submitted by practitioners pinpoint geographical areas where detailed investigations and surveys should be conducted. Systematic disease reporting by regulatory inspectors at stockyards and slaughtering establishments is of special value, since these data can be directly related to known animal numbers.

Through the use of these standard reporting procedures, sound statistical data become available in a form that can be rapidly processed and readily subjected to detailed statistical analysis.

Benefits accrue directly to the livestock industry through the utilization of animal disease reports by biological and pharmaceutical manufacturers in planning their production programs. The knowledge of disease trends and cycles thus provided, enables them to anticipate needs and gear their production schedules to specific disease requirements. As a result, reduced operating costs are reflected in lower prices to livestock producers. In addition, they guarantee the livestock industry an adequate supply for probable needs.

Modern clinical disease reporting techniques have many other advantages. For example, they are of material assistance in recognizing possible modes of transmission among animal species, both wild and domestic; and they provide indirect evidence of the effectiveness of animal disease control measures.

Thus it can be seen that reporting systems, in providing reliable and comprehensive information to scientific projects, answer a long-standing need in many related fields of effort.

By providing sound animal disease statistics on geographical and seasonal patterns, the reports serve as an additional protective measure to the entire livestock industry and to human health.

Coordination

Deficiencies of standard reporting systems can be overcome to some degree through the contributions and close cooperation of veterinarians at diagnostic laboratories, stockyards, and slaughtering establishments, and by adequate epidemiological investigations and proper surveys among the animal population.

State and national coordinators are responsible for final coordination and correlation of the reporting efforts, and for final organization to fit all into a harmonious whole.

To avoid confusion and keep reports as simple as possible, diseases must be reported by their preferred names rather than synonyms. To be of value, the data must include the number of cases, number of herds and flocks, and the counties involved.

In order for the national office to properly tabulate and consolidate the State's reports into a national summary, the State reports must conform to a general form type. Therefore, planning, guidance, and direction from the individuals responsible for all phases of the reporting activities are essential for necessary development and improvement.

Accreditation of Veterinarians

It has become increasingly apparent that communicable diseases of livestock cannot be controlled or eradicated on a herd basis alone. The manner of disease spread is complex. Eradication requires the participation of veterinarians in many segments of the profession. In recognition of this need, the Division and the State regulatory offices have relied heavily on veterinary practitioners to supplement the disease control activities of State and Federal veterinarians. Evidence of this reliance appears in most State and Federal regulations, which specify that certain movements can be made when certified by a full-time State or Federal veterinarian or an accredited veterinarian.

Considerable technical analysis goes into the development of animal disease control regulations. Clearly, State and Federal governments are delegating an important responsibility to the accredited veterinarians of the Nation. The certificates they are empowered to issue are extremely important in preventing the spread of livestock diseases.

Approved and accredited veterinarians

The former Bureau of Animal Industry for many years recognized accreditation of veterinarians. The need became evident soon after the inauguration of the tuberculosis eradication program in 1917.

A list was compiled of "approved" veterinarians who were authorized to conduct tuberculosis tests on cattle destined for interstate movement. "Approved" veterinarians were those who had received instruction in testing techniques, so that reliance could be placed on their ability to approve the interstate movement of cattle in connection with tuberculosis eradication. Later, lists of "approved" and "accredited" veterinarians were developed. The differentiation was: The "approved" veterinarian was qualified to perform the tuberculosis test, but it was necessary that he be "accredited" to issue interstate certificates.

Even in the early days, it was recognized that the receiving State officials had to place confidence in a health certificate issued by a practicing veterinarian in the originating State. As requirements for accreditation were developed, and standards for its maintenance were recognized, State and Federal regulations placed increasing responsibility on the accredited veterinarian to assure the healthy status of livestock in domestic and international transit. Unquestionably, the performance of accredited veterinarians has improved through the years that this classification has been in effect.

In the early days an accreditation examination was given by the Bureau of Animal Industry. This was later discontinued. Eventually, the responsibility of determining practitioner qualification was delegated to the State and Federal officials in charge of disease control and eradication activities in the locality where the practicing veterinarian desired accreditation. They determine the applicant's knowledge of interstate and export requirements and his ability to conduct tests and examinations according to established policies.

Recommendation is then made to the Director of the Animal Disease Eradication Division that the practicing veterinarian be accredited in that State. A further check by the Division is made to determine that the basic requirements of accreditation are satisfied.

Requirements for accreditation

(1) The applicant must be a graduate of a school approved by the Department of Agriculture.

(2) The applicant must be licensed in the State where accreditation is desired.

(3) The applicant must have demonstrated to the satisfaction of the State and Federal

disease control officials that he has knowledge of interstate and intrastate requirements, disease control and eradication programs, and capabilities in the desired techniques.

A register of accredited veterinarians is maintained by the Division. A certificate of accreditation signifying by whom accreditation was recommended, and approved by the Director or Acting Director of the Division, is furnished each accredited veterinarian.

Standards were reiterated and given to all veterinarians accredited during the year. It was pointed out that the accreditation of veterinarians is the responsibility of the Animal Disease Eradication Division. Since accreditation is recognized in many State and Federal regulations pertaining to intrastate, interstate, and international movements of livestock, it was thought advisable for the maintenance of uniformity to outline the standards under which an accredited veterinarian functions.

It stated that the following standards will be used to evaluate the proper conduct of the practitioner when performing services as an accredited veterinarian:

STANDARDS FOR ACCREDITED VETERINARIANS

1. All animals and poultry certified as disease-free will be inspected and identified by the accredited veterinarian issuing the certificate. All certificates issued must be signed by the veterinarian performing the inspections, vaccinations, and/or conducting the tests.

2. All certificates will be correctly and fully completed and forwarded to the appropriate State and or Federal official for approval. Distribution will be made according to existing policies and regulations.

3. Required tests will be applied according to recommended procedures using standard techniques prescribed by State and Federal officials.

4. Certificates issued that reflect results of tests performed by another veterinarian shall clearly indicate the name of the veterinarian conducting the tests, where tested, date, and the results.

5. All official test forms must be promptly completed and appropriate copies submitted to the laboratories or office of the State or Federal official.

6. All reactor animals disclosed by tests will be identified within prescribed time limitations and according to existing cooperative procedures within the State.

7. Supervision will be maintained over all infected herds and flocks including suspect animals and birds for which the accredited veterinarian is responsible under existing cooperative program procedures within the State.

8. Calf vaccinations will be performed at the prescribed ages using approved techniques with proper identification according to cooperative program procedures.

9. Official calf vaccination certificates will be promptly completed and copies furnished the owner and State and/or Federal office as called for by existing program procedures within the State.

10. All diagnosed or suspected cases of reportable diseases of livestock and poultry will be reported immediately to the State and/or Federal regulatory official.

11. The accredited veterinarian will fully instruct all owners of infected premises as to the proper method of cleaning, and inspection of cleaning and disinfection as may be required by the existing State and/or Federal policies.

12. Extreme care will be exercised in the cleaning and disinfection of footwear, instruments, nose tongs, etc., to minimize the danger of spread of disease between animals and premises.

13. All official duties and activities should be carried out according to conformity with regulations and instructions governing such duties and activities.

14. An accredited veterinarian will keep himself fully informed on the current policies and regulations of cooperative livestock disease control and eradication procedures and will advise livestock owners accordingly.

15. The performance of all official duties and activities of an accredited veterinarian in the State where such duties are performed is

subject to such supervision and direction as may be considered appropriate by the State and or Federal regulatory officials.

16. Failure to comply fully with these standards may be cause for removal from the list of accredited veterinarians.

VIOLATION OF STANDARDS

If the standards for accredited veterinarians are violated, the privileges of accreditation are removed. This action is taken on evidence of violation of standards upon recommendation by either the cooperating State or Federal official in charge of livestock disease control activities in the State where the violation occurred. It is preferred that the recommendation for removal of accreditation be made jointly. Restoration to the register of accredited veterinarians can be accomplished when the applicant has demonstrated proper intent of compliance with the standards to the satisfaction of both the State and Federal official in his State, who in turn make such recommendation to the Director of the Division. This recommendation must meet the approval of the Director.

THE COLLEGES AND REGULATORY VETERINARY MEDICINE

During recent years, the Division has worked with the Deans of the Schools of Veterinary Medicine regarding regulatory veterinary medicine and basic information on the duties and responsibilities of accredited veterinarians. Emphasis on this phase of veterinary medicine is being given by the schools, particularly to senior students. An exploratory examination on veterinary accreditation is offered the senior classes to determine the knowledge gained in this field. Excellent cooperation has been received from the schools of veterinary medicine.

The livestock industry and the livestock disease regulatory officials of this country recognize the very important part that the accredited veterinarians play in the disease control and eradication programs of the Nation.

Training

In the early years of Federal work in animal disease eradication, the responsibilities of the employee were limited to the eradication of contagious bovine pleuropneumonia. Use of a greater portion of the authority contained in the original Animal Disease Eradication legislation, plus additions to it, has since increased the complexity of programs and the duties of employees.

A Division veterinarian today must have a sound, basic knowledge of communicable animal diseases and the problems involved in their control and eradication. In most cases he must also be a supervisor and a manager. These factors have made it necessary for the Division to design special training programs to meet its specific needs.

Veterinary Administrator Development Program

In 1960, 13 veterinarians participated in the Veterinary Administrator Development Program. This activity provides training in the administration of ADE programs and helps prepare the trainee for a position of greater responsibility. The length, type, and place of training vary to meet the needs of the individual. Usually it comprises 9 months at designated Animal Disease Eradication and Animal Inspection and Quarantine stations, divided as follows: 2 weeks at the port of New York; 2 weeks at Laredo observing livestock export-import activities and Texas fever tick eradication; 2 weeks at the Chicago stockyards; 5 months at one ADE field station; and 2 months at another.

The trainee observes all phases of the technical programs as well as the administrative operations necessary for their implementation. During the periods at the two Division field stations the trainee frequently acts in the capacity of veterinarian in charge. This helps provide understanding of the problems and responsibilities in the operation of a station.

Epidemiology

During 1960, 15 ADE veterinarians received training in the basic principles of epidemiology at the United States Public Health Service Communicable Disease Center, Atlanta, Ga. In the year ahead, it is planned to make similar training available to approximately 100 Division veterinarians. Thorough understanding of the basic principles of epidemiology—broadly defined as the effect of a disease on a community—is essential to the development and efficient operation of eradication programs.

Blowfly identification

With the eradication of screwworms from the Southeastern United States, animals moving from the Southwest to the Southeast must be inspected to determine that they are not infested. Larvae or flies found within the eradication zone, and suspected of being screwworms, must be immediately identified and appropriate eradication efforts started. To this end, 25 personnel, including stockyard veterinarians, livestock inspectors, and serologists, attended blowfly identification courses at the Sebring screwworm eradication headquarters—another example of a program designed to meet a specific need.

Radiology

Approximately 50 veterinarians received training in 1960 to qualify them as radiological monitoring instructors. They, in turn, will conduct monitoring training courses in their respective States so that all employees will ultimately have a basic understanding of the problems involved in radiological defense. In 1961, it is hoped to train sufficient personnel in the use of radiation measuring devices so

that fixed monitoring stations can be established at each stockyard under Federal inspection.

Scabies, serology, and ticks

Identification of scabies mites, techniques for conducting serological tests, diagnosis of foreign animal diseases and anthrax, diagnosis of poultry diseases, and tick identification are additional examples of specialized training courses that have been conducted.

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Instructor watches as trainee examines scabby sheep.

BN-12079-X

Trainees learn to identify mites at a scabies training school.

The Division appreciates the necessity for continuing the development of all employees. As additional areas for specialized training are recognized, measures will be taken to satisfy the need.

Program Appraisal

Why?

An important concern of the Animal Disease Eradication Division is that its responsibilities are being properly and effectively carried out. To assure this, management must have reliable information on which to act.

This function is considered one of the most important to be initiated by the Division in recent years. It is designed to give constructive criticism and review of Division programs by its own personnel. It is an attempt to evaluate programs by people not involved in them, so that if certain aspects require modification or correction, they can be made for the benefit of all concerned.

Thus, it may be said that the chief reason for program appraisal is to develop and conduct reviews and analyses of Division activities in order to achieve more efficient and effective administration.

What it is

With the realinement of Division functions in 1958, there was provided a new function of Program Appraisal. It is neither a line nor an operating function, but a staff or advisory function. It does not make changes in procedures at any level. It is independent of line operations. Independence permits factual and unbiased reports.

Program Appraisal, of course, does not in any way relieve others in the Division of their primary responsibilities.

The functions and objectives of Program Appraisal are—

(1) To evaluate the adequacy and effectiveness of policies and procedures.

(2) To determine whether programs are being administered in accordance with established policies and procedures.

(3) To evaluate Division programs at National and State levels.

(4) To determine overall effectiveness, efficiency, and economy of operations.

How it operates

Program Appraisal personnel make station reviews and appraisals by visits to the stations. One or more of each of the following types of employees are visited and accompanied in their routine activities: District and area veterinary livestock inspectors, stockyard veterinarians, and fee-basis veterinarians. Other people, including Extension personnel, representatives of farm organizations, veterinary associations, and State employees are also contacted. Visits are made to laboratories, Federal stockyards, inspection stations, and approved auction markets.

Meetings with Division employees are usually made with no advance notice. In addition to observation and appraisal of field work and techniques, the following are reviewed:

(1) Supervision

(2) Plan of work and work assignments

(3) Public relations

(4) Knowledge of individual diseases and programs

(5) Attitudes concerning programs

(6) Available informational material

(7) Equipment and supplies

(8) Records and reports

It is important that information be obtained from field personnel in regard to all procedures used in the programs with which they are in contact. It is equally important that problems hindering the achievement of objectives be clearly defined. Finding deficiencies and defining problems is the key to efficient and eco-

nomical program operations. The purpose of program appraisal is not solely to unearth shortcomings of programs or personnel. But it is necessary to locate and define deficiencies and problems so that all of the Division's facilities may be utilized to correct them.

During program appraisal at a station, considerable time is spent with the Veterinarian in Charge. Each program is reviewed to delineate problems and to reassess objectives and goals.

Another important aspect of program appraisal is a determination of the cooperative relationship existing between Federal and State offices and the amount of support being given by farm and livestock organizations.

Other areas that are reviewed at the station level include work organization and planning, utilization of personnel, policies and procedures, training programs, funds, and records.

Usually a week is spent at each station with the time divided equally between office and field.

What it gives

With a variety of programs, a decentralized organization involving some 50 stations, and the fact that because of their cooperative nature programs vary from station to station, management must be informed of what is going on at the point of operation. This service is provided by program appraisal.

Another benefit is the location of deficiencies before they become the object of criticism by people outside of the organization.

Program appraisal is not a one-way effort concerned only with attempting to find deficiencies at the field level. It also tries to find problems, which, because local conditions make regulations unworkable, are handicapping field operations. By defining such problems, corrective action can be taken that will help make a smoother and more efficient operation.

Frequently, a station has devised an efficient method of performing some particular function. This information often is useful in other States. Program appraisal is a means of finding such procedures and passing on the information so that other States may benefit.

Cooperative Activities With Mexico

Between 1946 and 1954 over $100,000,000 was spent by the governments of Mexico and the United States in joint efforts to eradicate foot-and-mouth disease. Few investments have been more profitable. It has been estimated that the amount spent is equivalent to 1 year's losses were the disease introduced into the United States. There have been no recurrences of the disease in Mexico since April 1954. The results indicate the effectiveness of a strenuous campaign by two neighbor Nations in successfully completing a task that many thought impossible.

Activities in recent years have been carried out under authority of the Mexico-United States Commission for the Prevention of Foot-and-Mouth Disease. The Sub-Secretary of Agriculture for Livestock, for the Republic of Mexico, Dr. Daniel Mercado, serves as Director of the Commission. A small group of Mexican and American veterinarians still have the responsibility of checking reports anywhere in the country of animals suspected of being affected with a vesicular condition.

A number of vesicular conditions occurring in Mexico during 1959 were diagnosed through serological techniques as New Jersey type vesicular stomatitis. Most of the cases were along the United States-Mexican border. The condition was also diagnosed during the same period on a number of ranches on the United States side of the river. During 1960, vesicular stomatitis was diagnosed in Central and Southern Mexico.

Excellent cooperation is extended by officials of the Mexican Department of Agriculture and by Mexican members of the Commission in carrying out cooperative activities.

In 1959 arrangements were made with the Mexican Department of Agriculture for conducting a preliminary screwworm survey covering 300,000 square miles of northeastern Mexico, in conjunction with a similar survey being made in the Southwestern United States. A group of Mexican and American veterinarians and technicians interviewed veterinarians with the Mexican Department of Agriculture, veterinary practitioners, officers of cattlemen's associations, local government officials, packing and slaughter house personnel, ranchers, and farmers. The purpose of the survey was to determine the incidence and relative abundance of screwworms; the effects of climate, terrain, livestock practices, and other factors on the screwworm population in the different areas; and the existence, if any, of natural barriers to fly migration.

In essence, the study sought to determine the feasibility of a joint Mexico-United States screwworm eradication effort. The results of the survey are indicated in the report on screwworms.

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